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STEEL

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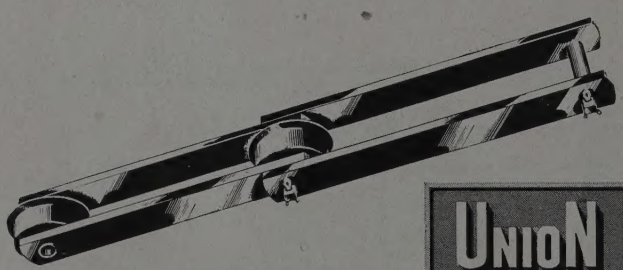

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UNION CHAINS

Harriman's Opportunity

As the EDITOR VIEWS the NEWS

Ouster of Henry Wallace as secretary of commerce and appointment of W. Averell Harriman as his successor should focus attention upon the responsibilities of that office and the need of conducting it in accordance with the purpose for which it was created.

Mr. Harriman is the fifteenth incumbent. The first four, who held office when the department was concerned with labor as well as commerce, were George B. Cortelyou, Victor H. Metcalf, Oscar S. Straus and Charles Nagel. Since 1913, when the departments of labor and commerce were separated, the secretaries of commerce have been William C. Redfield, Joshua W. Alexander, Herbert Hoover, William F. Whiting, Robert P. Lamont, Roy D. Chapin, Daniel C. Roper, Harry L. Hopkins, Jesse Jones and Henry A. Wallace.

In this list are men of widely divergent abilities. A few have served the office with distinction. The others either have rendered only mediocre service or have used the office as a springboard for extra-curricular activities.

Prior to 1933, presidents tried to appoint secretaries who by their experience were qualified to administer the affairs of the department in accordance with its statutory functions, which are "to foster, promote and develop the foreign and domestic commerce, the mining, manufacturing, shipping and fishing industries and the transportation facilities of the United States." In their appointments, Presidents Theodore Roosevelt, Taft, Wilson, Harding, Coolidge and Hoover seemed to be cognizant of the primary objectives of the job to be performed.

On the other hand, the appointments of President Franklin D. Roosevelt seemed to reflect a feeling that the post of secretary of commerce was a spot in which to pay off political debts or from which the appointee could disseminate New Deal propaganda. It is doubtful whether the late president ever appointed a secretary of commerce for the primary purpose of "fostering, promoting or developing" commerce.

Thus the department has declined to low estate. Daniel C. Roper was an excellent administrator of the old school of government career men but he had no great enthusiasm for business. To Harry Hopkins the post was simply a place to hang his hat. Jesse Jones had the experience and ability to be a great secretary, but his heart was in RFC. Henry Wallace was woefully miscast in the job.

Mr. Harriman has a great opportunity to restore the Department of Commerce to a high level of usefulness. Although his appointment manifestly was influenced by political considerations, he has the background and ability to become an outstanding secretary of commerce. Industry hopes he will accept that challenge.

WASTEFUL PRACTICES: One wonders whether the hard working, earnest officials in Washington who have been formulating policies and issuing regulations on price control have even a faint conception of the extent to which their handiwork has played havoc with orderly industrial operations.

Every manufacturer knows by actual experience of scores of instances in which impossible price rulings have forced producers of materials or components to abandon markets they have served faithfully and profitably for decades and to strike out into new and unfamiliar markets in order to keep their companies in business. Of course this desperate action is costly to the victim of price control, but it is even more injurious to the nation at large, which has to bear the burden of this grotesque uneconomic folly.

Likewise every foundryman and steel producer knows the dislocation that OPA handling of scrap prices has brought to the once orderly procedure of collecting, preparing and marketing scrap. Before OPA, scrap flowed to points of consumption with a minimum of cross hauling. Today the volume of

(OVER)

cross hauling of scrap is appalling, particularly in view of the scarcity of freight cars.

These are only two of many ways in which price control is promoting uneconomic practices. It is a debatable question whether the benefits of OPA in combatting inflation are sufficient to offset the wasteful practices its rulings have necessitated. —p. 39

* * *

A CHORE FOR OCTOBER: According to the Census Bureau, the number of persons who had reached the age of 21 last July 1 is estimated at 91,634,472. This figure, consisting of 46,403,210 women and 45,231,262 men, is approximately the number of persons eligible to vote in the November elections.

Unfortunately, millions do not exercise their right to vote. In the presidential election of 1944, only 47,976,263 or 54 per cent of the eligibles voted. In non-presidential election years the balloting is considerably lighter. In 1942 it was about 29,500,000.

In view of the present state of affairs, it is highly desirable that the vote next Nov. 5 be heavy enough to reflect the will of the people in convincing manner. As good citizens, all industrial executives should plan to devote a reasonable amount of time between now and then to the important business of promoting interest in the elections, urging all intelligent citizens to vote and assisting them to understand the issues that are involved.

* * *

STEEL IN C-I SECTION: Using rolled steel for the frames of electric motors is not new. Several manufacturers have been employing thinner sections of steel as a substitute for thicker sections of cast iron for a number of years. However, Westinghouse now is using rolled steel in new alternating-current motors in thicknesses equal to those of cast iron construction—with surprising results.

One noteworthy advantage is that the use of steel in heavy section permits production of a motor 35 per cent smaller than its cast iron counterpart. This is accomplished without sacrifice of electrical properties. Secondly, the important factor of corrosion is reduced to negligible proportions when sections of this magnitude are used.

It is likely that this adaptation of steel for a purpose that has been satisfactorily fulfilled by iron castings for generations has been prompted in part by the shortage of foundry products. Nevertheless, the new development in motor design will bear watching. —p. 94

SIGNS OF THE TIMES: A bit of encouragement may be garnered from the report of the National Machine Tool Builders Association that shipments of machine tools in August were up from those of July (p. 40) due in part to a better flow of components, including electric motors. . . . Not all wage earners have profited uniformly by the much-publicized increases in wages which have attended strikes in recent months. According to the Bureau of Labor Statistics, general wage changes in manufacturing industries caused an average increase of about 14½ cents per hour in wage rates between V-J Day and May, 1946. When all workers are considered (p. 46), the average gain is about 11½ cents per hour. . . . Machining stainless steels efficiently calls for constant attention to detail. For instance, in marking these steels for drilling, particularly 18-8 (p. 62), it is advisable to use a sharp-cornered punch, rather than a prick punch, to avoid work-hardening at the mark. . . . Decision of the U. S. Circuit Court of Appeals for the Seventh District (p. 33) upholding the basing point system of pricing in the cement industry, has far-reaching implications for the steel and other industries which use this method of merchandising their products. . . . Harsh antimonopoly legislative program (p. 42) is being pushed by a so-called "liberal" group in Congress which holds economic power is centered in too few hands. . . . Veterans housing continues one of the biggest domestic problems being wrestled with by the government, progress in getting shelter for the veterans being lamentably slow. Frustrated bureaucracy now is considering no fewer than five proposals to build prefabricated steel houses (p. 44) as a means of working out of their dilemma. . . . Coal production in France (p. 45) now exceeds the 1938 monthly average but still is inadequate with the nation increasingly dependent on imports. Currently the United States is shipping large tonnages of coal to France, something like 3,521,350 tons being shipped in the first eight months of this year. . . . Urgent need for producer goods and for American engineered machinery and equipment (p. 52) will continue for some time, in the opinion of a leading manufacturer who emphasizes the importance of increasing the supply of production machinery in these times of critical material shortages. . . . Consolidated Steel Corp. has started (p. 54) a new continuous pipe fabricating mill, first of its kind on the West Coast.

E. L. Shaner

EDITOR-IN-CHIEF

STEEL
September 30, 1946

Circuit Court Upholds Basing Point Pricing in Cement Industry Case

Federal Trade Commission's cease and desist order vacated and right of manufacturer to absorb freight costs where necessary to meet competition in districts outside home territory upheld. Decision has far-reaching implications for steel industry

By WILLIAM M. ROONEY
News & Market Editor, STEEL

FEDERAL Trade Commission's campaign to outlaw the basing point system of pricing, in effect in various lines of industry, has been given a sharp setback through a ruling on Sept. 20 of the United States Circuit Court of Appeals for the seventh district in which the pricing practice was upheld as not in violation of the anti-trust laws.

The decision, handed down in the cement industry case, has far-reaching implications, especially for the iron and steel industry whose basing point pricing practice has been under governmental attack for years. At present a case against the steel industry much similar to that in the cement industry is pending.

In its 2 to 1 decision, the Circuit Court vacated a Federal Trade Commission cease and desist order affecting 74 cement producers, and the Cement Institute, and upheld the right of a manufacturer to absorb freight costs where necessary to meet the prices of competitors located nearer a particular market.

The Commission's order, issued in July, 1943, restrained the cement companies from conspiring to set a common price for all brands of cement at any one point of sale. In vacating this order the Court ruled there was no evidence of conspiracy, and that the common price was necessary to foster competition because cement is a standardized, interchangeable product.

The ruling is viewed in legal circles as closely following the purport of the United States Supreme Court decision of June 1, 1925, which having found that no conspiracy or agreements had been involved in the industry's pricing methods, stated the use of basing points to which the FTC had objected "appears not to have been the result of any collective activity on the part of the defendants or cement manufacturers generally."

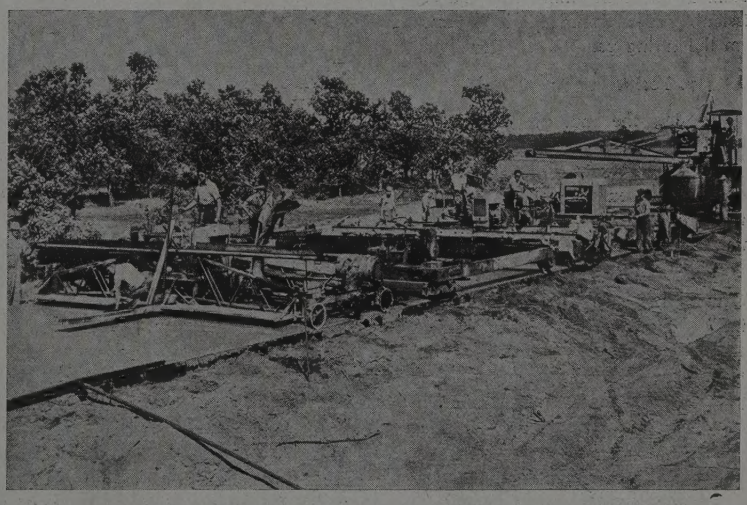
The Supreme Court ruling ended the old case which was instituted in 1921 against the cement manufacturers, but was followed by renewed charges culminating in fresh FTC suits in 1937. In this latter case the Commission again contended that the pricing methods used in selling cement were the result of a conspiracy and constituted a combination in restraint of trade. The Commission alleged that this was also in direct violation of the decision rendered by th Supreme Court.

Circuit Court Judge Otto Kerner concurring with Judge J. Earl Major, Judge Evan A. Evans dissenting, in their Sept. 20 decision found the cement industry sells goods on a delivered price basis, that sales are made on the basis of prices determined by the location at which actual delivery of cement is made, and that the market is always at the buyer's destination.

The formula used to make the method operative, the Court said, is that the delivered price at any location shall be "the lowest combination of base price plus all-rail freight. Thus, if Mill A has a base price of $1.50 per barrel, its delivered price at each location where it sells cement will be $1.50 per barrel plus the all-rail freight from its mills to the point of delivery, except that when a sale is made for delivery at a location at which the combination of the base price plus all-rail freight from another mill is a lower figure, Mill A uses this lower combination so that its delivered price at such location will be the same as the delivered price of the other mill."

Discussing freight absorption the Court said that such in reality means nothing more nor less than that each mill reduces its mill net by the amount necessary to enable it to meet competition where it is at a disadvantage freightwise.

The Commission had contended that



SPEEDS PAVING: The road machinery builders' answer to the labor shortage and high labor costs is partially contained in this mechanical paving unit, shown in operation at Elk River, Minn. The machine does a complete job of pouring, leveling, and cutting center lines. The unit rides on flanged steel rails which also serve to bind sides of roadway. Rails are removed after concrete hardens. NEA photo

the absorbing of freight by one producer to meet an equally low price of a competitor, thereby resulting in uniform delivered prices at all delivery points, constituted an illegal pricing method and contended that price competition results only when producers sell their product f. o. b. mill. The Court held that the Commission's contentions were not well founded, either under the law or under recognized economic principles. The Court indicated that to require compulsory f. o. b. mill pricing would be to require that each plant have a monopoly within that territory in which it enjoyed a freight advantage and that competition would be at an end. Furthermore, the Court said that if a plant is to be enjoined from absorbing freight in order to reach other markets, it is reasonable to think that the unit cost of that plant would be considerably increased and the price of cement to its home customers increased accordingly, and in fact, such plant might not be able to operate at all. "Thus, the Commission's solicitude for (a producer's) home customers would in all probability result to their detriment"; and further quoting, "As we have already shown, (the Commission) proposes to make supreme the advantage of a mill selling in the territory where it has a freight advantage and to make its disadvantage so great when selling in a competitor's territory as to practically preclude it from entering that market. In fact, the advantage and disadvantage would no longer be natural, but artificial, effected by the requirement that each mill sell on f. o. b. mill price. The change from the present system to one conforming with the Commission's order would be like jumping from the frying pan into the fire."

Says Position Is Not Clear-Cut

Discussing the multiple basing point pricing system, the Court said the Commission fails to take a clear-cut stand but vacillates between a system which merely permits the absorption of freight and one which requires the collection of phantom or fictitious freight.

Commenting on the term "basing point," the Court said that from the Commission's statement that the term "has meaning only because it correctly implies that the place of actual shipment may not be the basing point," it understands the statement to mean that a basing point system would be innocuous if all respondents sold cement from a base located at the actual point of shipment, which a great majority of respondents do and which all could do if they so desired.

The court held there is nothing in any of the cases decided subsequent to the old cement case which in any way changes or modifies the holding that no restraint on competition was effected by use of the basing point price system.

"As shown under the Corn Products and Staley opinions," said the Court, "its use under the Clayton Act as it relates to freight absorption remains an open question with an indication that such use is permissible."

Further along in its opinion the Court said: "As we have proceeded with our study of this case, we naturally have become impressed, not only with its magnitude and scope but also with the limitless possibilities and consequences involved. The Commission's order proposes to eliminate the sale of cement on a delivered price basis, notwithstanding the almost unanimous desire on the part of dealers and purchasers that it be so sold. Instead, it would require that cement be sold on an f.o.b. plant basis. Any and all discriminations, and they are calculated to be more numerous and complicated than under the system here condemned, will furnish the basis for contempt proceedings in this Court. We are to be made a police force for the purpose of guarding and directing members of this industry, wherever located, in a highly technical and complicated field. Before any Court gives its assent to such an ambitious program, it should be certain that it is required to do so by the law and the facts.

"Furthermore, the basing point pric system has been in use by the industr for almost a half century. There ha been and is a marked diversity of opinio among economists, lawmakers and peopl generally as to whether it is good o bad. Numerous bills have been introduce in Congress seeking to outlaw its use Countless time has been spent in hear ings by Congressional committees, be fore whom it has been assailed an defended. The pages of the *Congressiona Record* bear mute but indisputable proo of the fact that Congress has repeatedl refused to declare its use illegal. Ther is no occasion to relate this Congressiona history. It is a matter of common an general knowledge. In the Corn Product case, the Court in commenting upo some of this legislative history stated 'We think this legislative history indicate only that Congress was unwilling to re quire f.o.b. factory pricing, and thus t make all uniform delivered price system and all basing point systems illegal pe se.' Notwithstanding this Congressiona attitude as recognized by the Suprem Court, this court is now urged to hol that the system is illegal per se, and t require that cement be sold on an f.o.b

(*Please turn to Page* 146)

Present, Past and Pending

■ PIG IRON PRODUCTION RISES IN AUGUST

NEW YORK—Pig iron output in August was 4,897,980 net tons, against 4,705,277 ton in July, according to American Iron & Steel Institute. Cumulative production for eigh months this year was 27,407,393 tons, against 38,203,249 tons in comparable 194 period.

■ AUTO MAKERS CANCEL SOME MACHINERY ORDERS

DETROIT—Cancellation or suspension of low-price car programs by General Moto and Ford has resulted in similar treatment to appreciable lists of new machinery an equipment required for these projects.

■ LEAD SHORTAGE CLOSES GENERAL ELECTRIC PLANT

SCHENECTADY, N. Y.—General Electric Co.'s cable plant here has been shut down fo more than two weeks because of an exhausted lead supply.

■ STEEL FABRICATOR DENIED FREIGHT CONCESSION

PITTSBURGH—Interstate Commerce Commission's examiner has recommended IC uphold the policy of the Pennsylvania Railroad in refusing to grant a petition of H. H Robinson Co., this city, to have fabrication-in-transit privileges extended to shee and strip at Ambridge, Pa.

■ AIRCRAFT FIRMS ASKED TO PREFABRICATE HOUSES

WASHINGTON—Wilson Wyatt, housing expediter, is attempting to arrange with sever West Coast aircraft companies for production of aluminum fabricated houses.

■ SHEET STEEL SHORTAGE CUTS MOTOR TRUCK OUTPUT

CHICAGO—Continuing acute shortage of sheet steel is resulting in further reductio in the production of motor trucks at plants of International Harvester Co.

■ GENERAL MOTORS STILL HAS 57 SUPPLIER STRIKES

DETROIT—General Motors supplier strikes dropped one last week over the previou week, with 57 still affecting production.

■ JOSLYN ENTERS STAINLESS STEEL WIRE MARKET

FT. WAYNE, IND.—Joslyn Mfg. & Supply Co., Chicago, has added stainless steel wi to its production and is establishing this city as a basing point for this product.

Strike Hits Pittsburgh Operations

Walkout by power plant workers causes thousands to be furloughed. Wave of sympathy strikes threatened. Union leaders say "scab" power sets up "invisible picket line"

PITTSBURGH

INDUSTRIAL operations in this area were sharply curtailed last week by a strike of 3200 employees of the Duquesne Light Co. and associated companies.

An estimated 25,000 wage earners in industrial plants were furloughed when power to keep facilities in operation failed. Several thousand others stayed away from their jobs in sympathy strikes. Many other thousands were unable to get to their jobs as transportation bogged down and elevators ceased running. Many department stores and restaurants displayed signs, "closed for the duration."

Union leaders threatened a wave of protest strikes over the jailing for contempt of court of George L. Mueller, president of the power workers' union, who ordered the strike in defiance of a court injunction.

Workers Stage Sympathy Strike

Workers at the Jones & Laughlin Steel Corp. staged a sympathy strike at the company's Hazelwood plant which forced a sharp reduction in coke oven operation, banking of four of six blast furnaces and curtailment of finishing operations. More than 2000 workers left their jobs at the plant.

Westinghouse Electric Corp. workers left their jobs in protest to "scab" power supplied by working supervisory forces at the Duquesne Light Co. Union leaders introduced a novel argument to the effect that such "scab" power constituted an "invisible picket line" which union workers would not cross.

Steel producing and metalworking plants directly affected by the strike and the number of employees furloughed included: American Bridge Co., 2500; Wheel & Axle Division, electric furnaces at Duquesne and 80-inch hot mill at Carnegie-Illinois Steel Corp.'s Irvin works, 1500; Copperweld Steel Co., 1200; Firth-Sterling Steel Co., 1000; Crucible Steel Co. of America, 2500; Edgewater Steel Co. 700; Babcock & Wilcox, 2500; Scaife Co., 1000; Westinghouse Air Brake, 900; and Moltrup Steel Products, 300.

Striking employees of the Duquesne Light Co. stage demonstration outside the City-County Building, Pittsburgh, while court conducts hearing on injunction proceedings against the strikers. NEA photo

Lewis Asks Removal of Price Control of Meat

Asserting that "grave unrest" is spreading through coal mining areas and that miners are laying off because of their inability to obtain meat, John L. Lewis, president of the United Mine Workers, has requested the Price Decontrol Board to remove controls on meat. Mr. Lewis said mines in West Virginia, Kentucky and Virginia are closing down and warned that miners cannot dig coal on a diet of cereals and vegetables.

Canadian Steel Dispute Continues Deadlocked

TORONTO, ONT.

Negotiations among the various parties concerned in Canada's basic steel strike appear to have come to a temporary end and a settlement of the dispute that tied up the Steel Co. of Canada Ltd., Hamilton, Algoma Steel Corp., Sault Ste. Marie, and Dominion Steel & Coal Co., Sydney, is no nearer solution than it was at the middle of July.

Clashes between the strikers and workers at the Steel Co. of Canada broke out again last week, when the men who were given a week's holiday returned to work, and the Royal Canadian Mounted and Provincial police took no steps to avert or stop the fight, which might indicate that the government is holding aloof in the dispute. About 1000 men returned to the plant after a holiday last week and others are slated to return soon.

Production at the Hamilton works has been resumed and the company is stockpiling finished materials for delivery when the strike is settled or they can make rail and truck shipments through the picket lines. So far no shipments have been made by rail or truck since the strike started, although three shiploads of steel have been moved from the Hamilton works to Montreal over the water route involving approximately 9000 tons.

Sees Tighter Labor Supply In the Immediate Future

In spite of record peacetime levels in employment, the nation's labor supply will become tighter in the immediate future, according to A. Ford Hinrichs, former acting commissioner of the Bureau of Labor Statistics, and now an economist for the Kiplinger Washington agency, Washington, in an address at an office management conference of the American Management Association in New York recently.

"Unsatisfied needs for labor are being reported in considerable volume from many industries and communities," he said, adding, however, that the major consideration is not yet the numbers who are in demand, but rather the type of worker.

Changes In Commerce Dept. Few

Appointment of Averell Harriman as secretary succeeding Henry Wallace not likely to result in sweeping personnel changes

THE COMMERCE Department is not expected to undergo any sweeping changes as a result of appointment of W. Averell Harriman as its secretary succeeding Henry A. Wallace, who resigned at President Truman's request following Mr. Wallace's voiced differences on the administration's foreign policy.

Replacements in a few top posts in the department are likely but otherwise few changes are expected because Commerce Department executives generally are career men with whom Mr. Harriman, who served three times as chairman of the department's Business Advisory Council, has been acquainted for years.

Mr. Harriman, who at the time of his appointment last week to the commerce post was American ambassador to Great Britain, is expected to arrive in Washington early in October to assume his new duties. Meanwhile, he will visit Secretary of State James F. Byrnes who is in Paris attending the 21-nation peace conference. Until Mr. Harriman's arrival in Washington, Undersecretary Alfred Schindler will run the Commerce Department. It is uncertain whether Mr. Schindler will remain in the department, for he has an offer of an important job in private industry and also Mr. Harriman is expected to select his top lieutenants from men with whom he has worked closely.

There have been reports that Philip Dunham Reed, former chairman, General Electric Co., may be selected as undersecretary. Mr. Reed served with the Office of Production Management and the War Production Board and later was a liaison man with Mr. Harriman.

Another close friend and trusted adviser is William A. M. Burden, now assistant commerce secretary specializing on aviation.

Mr. Wallace had brought several New Deal economists into the Commerce Department to advise him and it is not expected they will stay now that their chief has left. Dr. Philip Hauser, whom

W. AVERELL HARRIMAN

Mr. Wallace appointed chief of the Office of Program Planning, will go back to his old post as assistant director, Bureau of Census.

President Truman's appointment of Mr. Harriman as secretary of commerce was regarded in Washington as foreshadowing a determined effort to build permanent peace with Russia through trade expansion. Mr. Harriman, a railroad man and banker by training, has had wide experience as to Russian needs in reconstruction. A former ambassador to Soviet Russia and a personal friend of Premier Stalin, Mr. Harriman resided in Russia from October, 1943, until last February. He has been well schooled in diplomatic dealings with the Russians, and from this standpoint it was believed in Washington that he would be able to offer valuable aid to Secretary of State Byrnes.

Mr. Harriman is heir to a great railroad fortune. He left the Republican party in 1928 and later was active in Washington almost from the beginning of the New Deal under President Franklin D. Roosevelt. His first important government assignment was as deputy administrator of the National Recovery Administration. He was in the Materials Division of the Office of Production Management when President Roosevelt sent him abroad on a lend-lease assignment. Formerly, Mr. Harriman held ownership in an investment banking firm. He also held offices with the Illinois Central and Union Pacific Railroads but resigned from them to become ambassador.

Mr. Harriman will be secretary of commerce as soon as he takes the oath of office. An interim appointee, he is not subject to Senate confirmation until Congress is next in session, that time now being slated to be the convening of the Eightieth Congress, Jan. 3. Little or no opposition to confirmation is expected for his appointment received the approbation of many business and political leaders.

Expects Improvement in Prestige

Robert R. Wason, president, National Association of Manufacturers, said, "Mr. Harriman is a businessman with international understanding. He will bring prestige to the nation abroad, and should finally give the Commerce Department a business administration."

William K. Jackson, president, United States Chamber of Commerce, asserted the appointment "ought to help destroy uncertainty" regarding United States foreign policy.

William Green, president, American Federation of Labor, commented that Mr. Harriman is "a capable man."

Gerald LeVino, chairman, foreign trade section of the Commerce & Industry Association of New York, remarked that "the business community as well as the government is fortunate to obtain the services of one so well qualified."

Elimination of Henry Wallace from the cabinet caused a wave of excitement at the State Department in marked contrast with the customary demeanor in that staid, dignified agency where protocol is the rule and most career men work with their coats on even in the hottest weather. State Department men hugged each other, shook hands, cheered, and some of them broke out with old-fashioned Indian war whoops.

On second thought there continued to be much criticism over the fumbling

stumbling behavior of President Truman in making up his mind finally to stand by Secretary Byrnes on foreign policy. Certainly the White House hesitancy in deciding an issue whose merits were apparent to the whole country will not help the State Department in its campaign to encourage good men to enroll in one of the many foreign service echelons on a career basis. The least that foreign service representatives can expect is that when they are out on difficult assignments, as in the case of Secretary Brynes and his party at Paris, they have the solid backing of the White House and the cabinet.

Inland Bids on Government East Chicago Iron Plant

Inland Steel Co. was the sole bidder Sept. 24 for the $34 million East Chicago, Ind., blast furnace and coke oven plant which it built and operated for the government during the war.

Inland proposed purchase of the plant for $12 million or to lease for a 5-year or 10-year period, with extensions of 5 years. In case of purchase, no government financing would be required. In case of lease, the company would pay 6 per cent of the market price of basic pig iron produced and 70 cents per ton of blast furnace coke not consumed on the premises.

New Pig Iron and Scrap Melting Process Tested

New process, which may cut melting time for scrap and pig iron to 20 per cent of normal, was given another test at Dominion Foundries & Steel Co., Hamilton, Ont., last week. The new method, known as the Kerry-Bailey process, was worked out by E. T. W. Bailey, combustion engineer of the Steel Co. of Canada Ltd., and F. G. Kerry, of the research department of Canadian Liquid Air Co., and solves the long standing problem of using oxygen to increase heat in open-hearth furnaces.

Bethlehem Gets Approval To Build Tin Plate Mill

More than $20 million worth of non-housing construction throughout the country was turned down by the Civilian Production Administration during the week ended Sept. 12. During the same period, 27 applications for commercial, institutional and industrial construction with a value of $8,195,176 were approved, including authorization to Bethlehem Steel Co. to build a new mill, costing $1,413,126 to produce tin plate at Sparrows Point, Md.

War Profits of 19 Shipbuilding Companies Figured as $356 Million

Kaiser disputes government's statistics. Claims profits offset by losses in steel and magnesium ventures. Congressmen charge "New Deal sacred cows" favored in placing contracts for vessels and facilities

GOVERNMENT figures stating that 19 wartime shipbuilding companies realized profits of $356 million on total capital investment of less than $23 million launched an investigation of war profiteering before the House Merchant Marine Committee last week.

Charges that favoritism was shown to "New Deal sacred cows" colored the hearing. So many conflicting figures were introduced that committee members confessed they were in "temple of confusion."

Central figure in the investigation was Henry J. Kaiser, head of West Coast shipbuilding, steel and magnesium companies.

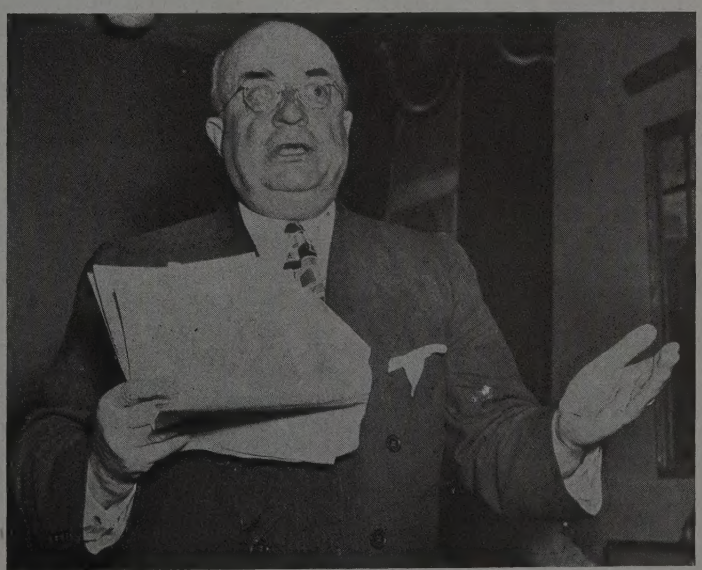
The General Accounting Office asserted Mr. Kaiser and associates had made profits of $192,237,284 on total capital investments of $2,510,000. These figures were hotly disputed by Mr. Kaiser who contended the Kaiser family, aside from other stockholders, made $41 million through Kaiser Co. Inc., plus $5 million through three other companies, but had lost $59 million in its steel operations for a net loss of $13 million.

Mr. Kaiser's figures, it was pointed out, did not take into consideration that Mr. Kaiser emerged from the war's operations as the owner of a $26 million magnesium plant and as having paid off half the cost of the $100 million Fontana Steel plant, for which the Reconstruction Finance Corp. advanced the money.

As to the magnesium plant, Mr. Kaiser said it was losing $50,000 a month, but added that with good fortune in finding some "wholly new products" now in research, this might end as a profitable company.

As to Fontana, he argued that he had been put in a "hopeless" competitive position unless RFC lowers its demands on him. Mr. Kaiser charged the United States Steel Corp. had been given an unfair advantage by being allowed to buy the Geneva Steel Co. for 20 cents on the dollar, while he (Kaiser) was required to pay off his RFC loan dollar for dollar.

When Mr. Kaiser was unable to answer numerous questions put to him by the committee he was accused by Rep. Fred Bradley (Rep., Mich.) of having "very convenient losses" of memory.



Charging that figures presented by the General Accounting Office were incomplete and misleading, Henry J. Kaiser, West Coast shipbuilder, steelmaker and auto manufacturer, last week defended his wartime shipbuilding operations before the House Merchant Marine Committee. NEA photo

Copper, Lead and Zinc Shortages May Force Some Plants To Close

OPA plans no increase in foreseeable future in ceiling prices of lead and copper, maintaining that June 3 increases, coupled with subsidies, comply with requirements of the law. Upward adjustment in maximum zinc prices expected soon

REFUSAL of the Office of Price Administration to authorize increases in ceiling prices of lead and copper and its delay in taking action on a zinc price revision are retarding shipments of these metals to consumers, according to trade reports.

Shortages of these metals threaten to force a curtailment in manufacturing operations.

OPA has announced that no increases in current ceiling prices of lead, lead scrap, primary and secondary copper, copper scrap, copper-base alloy scrap or brass mill scrap is planned in the foreseeable future. The government's position is that substantial increases for lead and copper were granted June 3 and that increases, coupled with the subsidies paid for these metals, comply with requirements of the Price Control Extension Act. The price agency has pointed out also that the premium price plan for copper, lead and zinc makes premiums available for domestic mine production of these metals and the RFC is able to buy foreign metals and resell them here at the domestic ceiling prices.

Holds Higher Prices Needed

The lead industry contends, however, that higher prices are necessary to stimulate the activity of secondary lead producers, to lessen the gap between the domestic ceiling price and the foreign market, to lessen the use of lead in nonessential applications through setting a price that more correctly reflects its competitive position in the country's economy, to develop the production of lead from a long-term point of view (which is not possible under a one-year subsidy plan), and to unfreeze the heavy tonnage of lead that was made from concentrates and scrap purchased at the 9.5-cent price in July when OPA was inoperative.

While government officials and producers have widely divergent views on the price question, both agree that there is a wide gap between estimated supply and demand. Current domestic lead demand is in excess of 1 million tons annually whereas the indicated supply is around 750,000 tons. It is obvious that many lead consumers will be unable to obtain their full requirements.

The Automobile Manufacturers Association believes that some companies will be forced to drastically curtail production before the end of October, while the National Electrical Manufacturers Association has warned that shortages in the supply of various materials, including lead, are restricting production. Western Electric Co. and many other large consumers of lead are planning to curtail their plans for increased operations.

Shortage of copper is attributed mainly to prolonged strikes, some of which lasted eight months, and to a generally unsatisfactory price level. The most pressing problem restricting current supplies of copper is the question of adequate premiums for special shapes, especially those for cakes and billets. Production of copper cakes has ceased and production of billets is being curtailed sharply. Seriousness with which the brass mill industry views the situation is indicated by the fact that its advisory committee announced earlier this month that "until an adequate supply of raw materials of proper grade is available and premiums are authorized for copper refinery shapes which will encourage the fullest use of existing capacity, no further meetings should be held." However, OPA is reported unofficially as finding "no adequate grounds for granting higher premiums for special shapes." Members of the Copper Water Tubing Manufacturers Industry Advisory Committee have told CPA that in order to sustain maximum production their monthly needs are 38 million pounds of copper billets and that present receipts are not more than 25 million pounds.

Production of copper has increased steadily since the end of the strike two months ago, amounting to 64,209 tons of crude and 59,591 tons of refined copper in August, gains of 7300 and 16,000 tons, respectively. Deliveries rose 22,000 tons last month to a total of 118,814 tons, consisting of 66,105 tons of domestic metal and 52,709 of foreign metal contributed by the Office of Metals Reserve. Stocks of copper at refineries declined 6514 tons to 94,669 while those of blister copper increased 4618 tons, making a net decrease in all stocks of 1896 tons.

OPA's recent statement that no in-

BATCHELLER HONORED: Hiland G. Batcheller, president of Allegheny Ludlum Steel Corp., receives the President's Medal of Merit for his services with the War Production Board. Medal was presented by Secretary of War Robert P. Patterson, left

crease in copper prices is planned in the foreseeable future was issued to end pricing uncertainties and to discourage any future withholding of copper or copper scrap in anticipation of a price increase. CPA is studying its inventory controls over copper so as to provide maximum assistance in preventing the accumulation of excessive inventories of copper. The industry generally believes that these moves will be ineffective in relieving the shortage.

In another move to relieve the scrap shortage, CPA has provided for allocation of copper and copper-base alloy scrap sold by the Army, Navy and Maritime Commission in lots of 5 tons or more. These agencies will no longer declare such scrap as surplus to the War Assets Administration but will sell to consumers according to CPA allocation. WAA will dispose of scrap now in its possession to smelters or reprocessors on their certification or to the RFC, buying for them.

OPA is expected to announce an increase in ceiling prices of zinc to at least the 9-cent East St. Louis level within a few days. This would be one-half cent below the level which p oducers claim is necessary to bring out necessary supplies. Acting to stave off the impending shutdown of a number of zinc-consuming plants CPA recommended last month the resumption of limited release of zinc from the government stockpile. Only high-grade zinc is being released, however, because of the small tonnage of the other grades remaining in the stockpile. This action was necessary because some producers have withdrawn from the market, due to dissatisfaction with prevailing prices.

As of Aug. 31, these stocks totaled 150,957 tons of high-grade metal, 41,707 tons of prime western, 15,084 of brass special, 5595 of intermediate, and 1200 of special high grade, or a total of 214,-543 tons. This total includes 15,920 tons of high grade zinc allocated to consumers as of Sept. 12.

As of Aug. 31, the monthly zinc output rate was 31,416 tons less than the normal monthly consumption of 72,000 tons. This deficit cannot be made up from imports, CPA says, as the foreign price is now in excess of OPA ceilings.

Under the government's program for the importation of scarce nonferrous metal ores and concentrates, RFC's Office of Metals Reserve buys these products at the lowest price it can and resells them on the domestic market at prices which enable refiners to operate within OPA ceilings. Any losses incurred under this program are absorbed by the government. The amount of loss per unit varies with changes in the relationship between foreign and domestic p ices.

Specialty Steel Producers Seek Revision in OPA Scrap Schedule

PITTSBURGH

A GROUP of electric furnace and acid open-hearth steel producers in the Pittsburgh district are seeking to have billet, bloom and forge crop scrap reinstated as a separate c assification and at the former price differential in price regulation No. 4.

Elimination of this grade of scrap as a separate listing under classification 13 in amendment No. 8 to the price schedule, issued Sept. 11, has created a critical problem in the procurement of these items by specialty steel producers. This high quality scrap is considered a "must" in the production of tool steels, die blocks and other specialties. The Pittsburgh group of producers has developed processes and specialty steel products that are dependent on a free flow of these scrap grades.

Members of the board of directors, Institute of Scrap Iron & Steel, will meet in Washington on Oct. 9 to discuss the OPA decision on scrap prices. Members of the Scrap Industry Advisory Committee will meet with officials of the Civilian Production Administration in Washington Oct. 1 to discuss distribution and inventory problems.

Producers of billet, bloom and forge crop scrap are withholding shipments and have canceled existing orders, because this type of scrap no longer commands the former $5 per gross ton premium over heavy melting steel.

In their appeal to Paul Porter, administrator, Office of Price Administration, the Pittsburgh producers say that amendment 8 to MPR-4 has brought about an insurmountable crisis among electric furnace and acid open-hearth steel producers for reasons outlined above. The appeal was made by the following, constituting a majority of these specialty steel producers in the district: Railway Steel Spring Division, American Locomotive Co., Blaw-Knox Co., Continental Foundry & Machine Co., Crucible Steel Co. of America, Firth-Sterling Steel Co., Ft. Pitt Steel Casting Co., Latrobe Electric Steel Co., Mackintosh-Hemphill Co., McConway & Torley Corp., Mesta Machine Co., Reliance Steel Casting Co., Union Spring & Mfg. Co., and Heppenstall Co.

The government's latest move to alleviate the scrap shortage is its drive to obtain heavy melting scrap from farms.

Other phases of the government's program include the scrapping of surplus ships, which is expected to supply some 750,000 tons of heavy melting scrap within the next few months, and the reinstitution of CPA salvage committees.

Imports Boost Tin Supply; Inventories Seen Rising

Tin supply has turned slightly upward but there is no certainty that this trend can be maintained.

One reason for the improvement this year is that we are receiving about 10,000 tons of pig tin accumulated in Japan and Japanese-occupied countries during the war. Additional imports expected to be received during the last four months of this year include 10,000 tons from Bolivia, including metallic content of concentrates, and 10,000 tons of tin in concentrates from other sources. These expected imports plus 57,753 tons held by the Reconstruction Finance Corp. on Aug. 31 makes the total anticipated supply 87,753 tons available for allocation.

Consumption of new tin will be held at an anticipated rate of 5200 tons per month, including 3700 tons of refined tin from the Texas City, Tex., smelter and 1500 tons from stocks, or a total of 20,800 tons the four-month period. In addition, 2050 tons monthly, or a total of 8200 tons, will be available from scrap tin. This will leave RFC inventories at about 66,953 tons at the end of 1946. or 9200 tons over the Aug. 31 total.

Production of tin is being revived very slowly in the Netherlands East Indies, British Malaya and elsewhere in the Orient and large shipments are not expected from these areas prior to 1948 or 1949.

Reconstruction Finance Corp. signed a contract last month with Bolivian tin producers for the purchase of tin ore and concentrates to be shipped to the Texas City, Tex., smelter. The base price for the tin content is 62.50c a pound, fob vessel at the ports of Antofagasta or Arica, Chile, or Mollendo, Peru.

Steel Supply Expected To Balance Demand in Year

Steel production is expected to equal demand in about a year, Benjamin F. Fairless, president, United States Steel Corp., said last week in San Francisco.

He said the Geneva, Utah, steel mill will be operating at 75 per cent of capacity as soon as a coking coal shortage is alleviated. At present the plant is operating at about 40 per cent.

August Machine Tool Shipments Gain

Substantial improvement over July movement reported, reflecting rise in components supply. Tool builders may cut to 40-hour week

IMPROVEMENT in the supply of bearings for machine tools is reported as an important factor in increasing August machine tool shipments $4,490,000 over the July movement. Estimated shipments in August totaled $26,850,000, according to the National Machine Tool Builders' Association.

To some extent an improvement in the supply of electric motors for powering machine tools helped boost August shipments. However, the motor supply was far from adequate and in many instances machine tools were shipped without motors and other electrical equipment, giving purchasers opportunity to equip the machines with motors and controls they might have on hand. Among the critically short items for machine tools are pipe fittings.

Also contributing to the increased shipments in August was the desire of machine tool makers to fill as much of their backlog of orders as possible before purchasers shifted orders to other companies in an effort to obtain quicker delivery or before pessimism over business conditions could bring about cancellations of orders. That their fears as to cancellations may be well founded is seen in the association's report that the dollar volume of order cancellations was 75 per cent higher in August than in July and also exceeded any other month thus far in 1946.

Considering Shorter Work Week

The machine tool industry, now working largely on a 44-hour week, is contemplating a 40-hour week. With some components for machine tools in short supply a 40-hour week would be sufficient as well as more economical than a 44-hour week, some of the industry members believe.

Total machine tool shipments for the first eight months of 1946 are estimated at $217,016,000, a decrease compared with total shipments of $299,455,000 in the corresponding period of 1945. However, shipments in the first eight months of 1946 exceed shipments for the entire year in each of the years 1929 to 1939, inclusive. High mark of shipments in 1946 was set in January when the total was estimated at $30,263,000, and low point was $22,360,000 in July.

AT SURPLUS INQUIRY: Appearing before a House inquiry into disposal of surplus electronics equipment were these three officials: Left to right, Gustav Schwarz, director of sales, planning division of War Assets Administration; Frank R. Creadon, deputy administrator, general disposal office; and Brig. Gen. J. A. Mollison, deputy administrator, aircraft disposal. NEA photo

Sales of government surplus machine tools this year has about equaled the sales of new machine tools, according to members of the industry.

Volume of new orders in August was practically unchanged from the July volume, and backlog of unfilled orders in August was 2 per cent lower than in July, when the backlog reached a new high for 1946.

New foreign orders and shipments on foreign orders were lower in August than in any other month in 1946. Cancellations of foreign orders in August were more than double those of July, and the backlog of unfilled foreign orders declined slightly.

Overhead Crane Demand Holds At Unusually High Level

New York—Still nearly 50 per cent of the peak war demand, buying of industrial plant overhead cranes is holding at an unexpectedly high level considering the number of used units offered, most of which are in good condition. Original builders are generally acting as agents in the disposal of their own units and this heavy equipment is gradually being absorbed without too much confusion.

New crane volume is sustained by replacements and additional units while several large inquiries are out or placed for the equipment of new plants.

Divisional plants, American Brake Shoe Co., have placed large orders for crane equipment, notably with Harnischfeger Corp., Milwaukee. For a new plant for building of generators, at Schenectady, N. Y., General Electric Co. is installing five 200-ton units and numerous 100-ton and smaller electrical bridge cranes. Bureau of Reclamation is also a heavier buyer for hydroelectric projects in the West.

Demand for Tools Continues To Decline at Pittsburgh

Pittsburgh—Downward trend in machine tool orders continued throughout September with sales amounting to only 40 to 50 per cent of quotas established earlier this year. Temporary shelving of many expansion projects, due to curtailment placed on nonhousing construction, is believed to be the chief cause for the

decline in machine tool demand the past two months.

Scarcity of electrical motors and other components has prevented machine tool builders from making much progress toward a reduction in their unfilled orders, despite the lighter demand. The industry's order backlogs are extended six months or more on specialty machines. Lathes generally are available within four months, while shipments on hacksaws and small hydraulic assembly presses are promised within two to three weeks.

Spurt in Some Tool Sales Is Reported at Cleveland

Cleveland—Machine tool builders report a spurt in sales of equipment used in the production of pipe fittings, but this is counteracted by a decline in demand for other types of machines due mainly to government restrictions on industrial plant construction. Sales of new equipment have been retarded also by the intensive campaign to dispose of surplus war equipment.

Due to the uncertain international situation, the trade believes that a large portion of special machinery used during the war to produce munitions may not be converted to peacetime uses or scrapped, as originally planned, but will be stored in government warehouses. Some members of the industry also believe that the government will make constant revisions in its equipment in arsenals to keep them abreast of new developments in munitions. Transactions in surplus government machinery are still hampered by "red tape." For instance, one nationally known manufacturer found the exact piece of machinery he wanted in Chicago, but WAA employees were required to pack it for storage before releasing it to him because instructions had been previously received to perform that service.

Machine Tool Disposal Policies Of WAA Are Hit by Distributors

Present functioning of government agency criticized in strongly worded resolutions adopted by industry representatives meeting at Hot Springs, Va. Speaker tells group new business holding up but warns cancellations may be in offing

By GUY HUBBARD
Machine Tool Editor, STEEL

HIGH SPOT of the twenty-second annual convention of the American Machine Tool Distributors' Association at The Homestead, Hot Springs, Va., Sept. 18 and 19, was unanimous adoption of strongly worded resolutions regarding the present functioning of the War Assets Administration in disposal of machine tools and other metalworking equipment.

Identifying itself in the preamble as: "A national organization of more than 20 years standing and comprising member companies handling more than 95 per cent of all machine tools sold through distributors, and acknowledged by high military and other governmental officials as having rendered the country outstanding service," the association set forth the following:—

1. It condemns the inefficiency and laxity which permeates the administration of the disposal of surplus machine tools.

2. It demands that the War Assets Administration give proper consideration to needs of future national defense by assisting the War and Navy Departments in setting up adequate reserves of machine tools out of present surplus stocks.

3. It objects to the present failure to consult, on matters of policy, with the machine tool industry and demands that a real advisory committee be reconstructed and that such committee be utilized for its advice on all policy matters.

4. It warns of the serious danger to the disposal program and to the economic welfare of the industry, existing in panicky, unsound and unworkable plans now contemplated in revision of the Clayton Plan—changes which may lead directly to unbridled speculation, and it insists that a representative advisory committee be consulted before such revolutionary changes are instituted.

5. It urges that those now in authority in WAA familiarize themselves with the fundamental consequences to our country of unwise policies applied to this vital but relatively small industry and that, in harmony with the intent of Congress, they abstain from practices that may be mortally injurious to the machine tool industry, and therefore to the future of the United States.

Maj. Gen. Robert M. Littlejohn, administrator, War Assets Administration, was advised by wire of these resolutions and also they are being brought to the attention of senators and representatives.

Guest speaker at the convention was Tell Berna, general manager, National Machine Tool Builders' Association, Cleveland. Mr. Berna posed this question: "Why must we start from scratch every time there is a war; why not keep our arsenals and naval shops up-to-snuff between wars?" He expanded on this theme in line with the second article of the resolutions, emphasizing his remarks by citing orders for the scrapping of basic munitions machinery used in shell production.

This speaker admitted that new machine tool business has held up remarkably well since termination of hostilities, but warned that many cancellations may be in the offing. He said that the considerable amount of foreign business just now is due in no small degree to certain "islands of normalcy" existing in war-torn Europe. He mentioned Sweden and Switzerland in particular. Reconstruction of industry in other European countries waits on loans. The empire market for machine tools will—he believes—be supplied by England.

Mr. Berna closed by saying that our government is too largely concerned

(*Please turn to Page* 146)

Calendar of Meetings . . .

Sept. 30-Oct. 2, American Society of Mechanical Engineers: Fall meeting, Boston. C. E. Davies, 29 West 39th St., New York 18, secretary.

Oct. 1-4, Association of Iron & Steel Engineers: Convention and Iron and Steel Exposition, Public Auditorium, Cleveland. Association headquarters are at 1010 Empire Bldg., Pittsburgh.

Oct. 2-5, Society of Automotive Engineers: National aeronautical meeting and display, Biltmore Hotel, Los Angeles. John A. C. Warner, 29 West 39th St., New York 18, secretary and general manager.

Oct. 3-5, National Electronic Conference: Sponsored by the Illinois Institute of Technology, Northwestern University, and the Chicago sections of the American Institute of Electrical Engineers and the Institute of Radio Engineers, Edgewater Beach Hotel, Chicago.

Oct. 7-9, National Machine Tool Builders' Association: Annual meeting, Chateau Frontenac, Quebec, Quebec. Frida F. Selbert, 10525 Carnegie Ave., Cleveland 6, is secretary.

Oct. 7-11, American Gas Association: Annual convention and exhibition, Auditorium, Atlantic City, N. J. Headquarters of the association are at 420 Lexington Ave., New York 17.

Oct. 8-9, American Management Association: Conference on labor relations sponsored by the Personnel Division, Hotel Statler, Boston. Headquarters are at 330 W. 42nd St., New York.

Oct. 10-12, American Society of Tool Engineers: Semiannual national convention, Hotel William Penn, Pittsburgh. Society headquarters are at 1666 Penobscot Bldg., Detroit 26.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Harsh antimonopoly legislative program is being pushed by so-called "liberal" group which holds economic power is centered in too few hands. Ideas of legislators embodied in S. 2482 introduced just before 79th Congress adjourned

IF A GROUP of "liberal" legislators gets its way, harsh penalties are in store for future violators of the antitrust laws. This group is satisfied that concentration of economic power in comparatively few hands results to a large extent from universal disregard of the antitrust laws. One of the remedies, it believes, is to provide penalties so stiff as to compel compliance.

The ideas of this group are embodied in S. 2482 which is intended to take final form as "The Monopoly Act of 1947." Under it an officer or director of a violating corporation may be subjected to a fine "equal to twice his compensation over the entire period during which he has had a part in incurring such violation." Or, he may be enjoined, permanently or over a period, from continuing his company connection, or "engaging in business whether on his own account or as an officer or director of any other company competing with his former company."

S. 2482 was dropped into the hopper just before the 79th Congress adjourned, and it has had no publicity. It is to be reintroduced in the 80th Congress. Sponsored by Senators Morse, Aiken, Langer, Murray, Mitchell, Kilgore and Young, it will receive support from all the so-called "liberals" in Congress, particularly those who follow the CIO line. S. 2482 is a bill of "omnibus" type and was still in immature form when introduced so as to become a part of the record of the 79th Congress. It is expected to be revised substantially as a result of a series of hearings this fall and next year.

Enforcement Officers To Be Quizzed

This fall's hearings will be held by the Kefauver Monopoly Subcommittee of the House Small Business Committee and will be devoted to questioning representatives of the Justice Department, Federal Trade Commission, Federal Communications Commission, etc., about enforcement procedure. The Kefauver subcommittee's assignment, as its part in the overall antimonopoly drive, is to ascertain whether these agencies are lax in enforcing the antitrust laws. The agencies will be called on the carpet to explain why they have failed to prevent growth of monopoly.

Another assignment in the overall antimonopoly drive has been accepted by the Senate Small Business Committee. Whether this committee will hold hearings this fall still is undecided. However, the committee at least will get out another report intended to serve as the basis of future legislation. It will be comprised of case histories to show the use of patents in promoting monopoly. The glass and chemical industries will be the principal targets of this report.

The Senate Small Business Committee also has two other objects in mind. One is to write an omnibus monopoly bill that would mark an advance over S. 2482. The other is to lay the basis for bringing up-to-date the monopoly studies of the old Temporary National Economic Committee.

The renewed antimonopoly drive will be featured by a revival of attacks on the American patent system. For example, S. 2482 has a patent title originally introduced in the House as the Voorhis bill, H. R. 3462. Under it every license or other action under a patent would have to be reported to the attorney general, with a stiff fine for noncompliance. It would outlaw price stipulations, production quotas or the assignment of geographical areas under license agreement.

Under S. 2482 the President would report annually to the Congress on monopolistic aspects currently existing in American business and industry. The bill would prohibit American participation in international cartels. It calls for elimination of "discriminatory" freight rates; it directs the Interstate Commerce Commission to establish, within nine months, a uniform classification of property and a uniform scale of freight rates for universal application throughout the United States. Under still another title it would give the Federal Loan Administrator extensive powers to assist small business.

LT. GEN. L. H. BRERETON
Who will be appointed a member of the Military Liaison Committee of the United States Atomic Energy Commission, a civilian body. The liaison committee will consult with the commission on the military applications of atomic energy. NEA photo

Another part of the overall antimonopoly drive is covered by the Fulbright bill, S. 1248, (STEEL of Sept. 23, p. 84) which would give the Secretary of Commerce extensive powers to pass on the value of individual inventions and to develop them with public funds—with the object of encouraging large-scale production of government-owned patents which would be available for anybody's use on a nonexclusive royalty-free basis.

The danger of these threats to the patent system is very real, as demonstrated by the fact that the Atomic Energy Act now is law, while the Kilgore-Magnuson Science Foundation bill, S. 1850, was approved by the Senate and escaped action in the House only because it was received too late by that body. The Atomic Energy Act sharply limits the patentability of inventions for production or use of fissionable material and will have the effect of discouraging research in this field. The Kilgore-Magnuson bill if enacted will serve to keep government research projects out of many laboratories in which they could be worked on most effectively and efficiently. This bill allows very few exceptions, and then in most exacting terms, to the general rule that inventions produced in the course of research work financed by the government are to become the property of the public.

Altogether, the antimonopoly drive is not to be taken lightly. It is a continuation of the whittling process which during the past five decades has brought government more and more into the field of business. The process is one which, if not resisted intelligently, will result eventually in putting all business under the control of the government.

Bring German Scientists Here

Contrary to published reports, not all the cream of the scientific and technological brains in Germany has been skimmed off by the Russians. Under a State-

Bryant Thread Gages

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ANYONE who can *push* a lever, *drop* a part, and *read* a large dial gage, *can inspect threads* to any desired degree of accuracy on Bryant Thread Gages. That's how easy it is. There's no slow and tiresome threading of plug and ring gages into and onto the work. There's no "feeling" for the class of fit.

Combined with this ease of operation is speed. The Bryant Method is *four or five times faster* than plug or ring gaging. Because the method is so simple, this speed is attained by inexperienced operators *on the first day.*

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Please send me Catalog No. G3 which gives complete details on the Bryant Thread Gages.

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NEW PORTABLE THREAD GAGES

and Squareness of Face Gages, Universal Hole Size Gages, Both Internal and External.

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WHITE HOUSE CALLERS: Bernard Baruch, right, who presented the American plan for atomic energy control to the United Nations Atomic Energy Commission, and John M. Hancock, New York industrial banker and close adviser to Baruch, are shown leaving the White House where they conferred with President Truman. NEA photo

War-Navy program started early this year, more than 200 German and Austrian scientists have been brought to the United States and are working on Army-Navy projects. Now the program is to be expanded and a large additional number of German specialists is being screened preparatory to bringing them here. All are coming on a voluntary basis, and the screening operation is aimed at keeping out active Nazis, war criminals and incompetents.

The plan is to turn them over to American industry after the Army and Navy have finished with them, and they will be fed into private industry through the offices of the Department of Commerce. Arrangements now are being made to bring over the families of these men. In addition, a move has been started to allow them to apply for citizenship "so that their abilities will become a permanent asset to the nation."

According to a War Department spokesman, the German and Austrian scientists involved are contributing impressively to our knowledge of electronics, supersonics, guided missiles and jet propulsion, and they are making distinctive contributions in such general fields as fuels and lubricants, diesel and turbo-jet engines, optics, synthetics and other phases of applied physics and chemistry.

Extend Motor Export Licenses

The authority of limited production licenses covering exportation of motor vehicles produced in 1945 and 1946 under CPA Limitation Order L-352 has been extended by the Office of International Trade, Department of Commerce, through the fourth quarter of 1946. The order applies to new passenger cars, highway and off-highway type trucks, bus chassis and truck tractors.

Similarly, licenses covering exportation of track-laying or wheel tractors produced or shipped for export since June 30, 1946, now are good through the fourth quarter. Furthermore, validity of limited production licenses has been extended 31 days beyond the end of the fourth quarter.

OIT also has added fractional-horsepower motors, temperature controllers and parts, thermostatic temperature regulators and parts, thermostat switches, thermostats and parts (except industrial) to the list of commodities which may be exported under consolidated license procedure to Group K countries.

Opportunity in Alaska

One of the military headaches in Washington is the small population of Alaska—the territory has some 73,000 men, women and children scattered over 586,000 square miles, and of them some 40,000 are whites. To secure that outpost if war should come to us over the polar ice cap, a population of several millions would make a great difference.

Recently there have been two favorable developments. Some of the well-financed and resourceful construction companies which went to Alaska to build airfields, roads and other facilities during the war have shown an interest in linking their future, at least in part, with that of the territory. Also, Canadians are showing an interest in developing Alaska; several Canadian mining companies recently have bought options on mining properties in a number of Alaskan districts.

Alaska unfortunately has not been advertised in the United States as the land of opportunity which it is. So far only the salmon and the fur seal industries there have been exploited on a substantial scale. Awaiting development are huge resources in timber, wildlife, water power and a liberal assortment of minerals. So far the surface only has been scratched. A good example of the present negligible size of the Alaskan economy is found in latest figures of the Bureau of Mines which reports minerals output in Alaska in 1945 had a value of $10,210,000. And this figure represented a gain of 48 per cent over the 1944 production.

Prefabricated Housing Pushed

No fewer than five proposals to build prefabricated steel homes for the veterans housing program now are under consideration by the National Housing Administration. Sample sections furnished by two of the companies involved now are undergoing tests at Penn State College. One of the major objectives is to determine whether condensation of moisture under winter conditions—with 70 degrees Fahr. or higher indoors and sub-zero temperatures outside—is a factor limiting the life of steel in the designs.

Now coming up for investigation are the designs for the Higgins house, involving inside and outside surfaces of enameled steel with a layer of concrete in between, and for an all-porcelain enameled steel house projected by a Chicago company with extensive experience in building hamburger stands. The fifth project is that under which the Wm. H. Harman Corp., Philadelphia, is slated to get a guaranteed-market contract for 10,000 prefabricated steel homes (STEEL of Sept. 9, p. 94); the Harman contract is expected to be placed shortly.

Signing of guaranteed-market contracts for prefabricated aluminum homes still is held up pending the conclusion of tests on different designs.

Aids to Small Business Promised by Rep. Patman

Rep. Wright Patman (Dem., Tex.), chairman, House Committee on Small Business, is planning an active legislative program beginning with the opening of the 80th Congress in January to promote the welfare of small business. One measure in this program is a bill, which Representative Patman hopes will eliminate "gentlemen's agreements" creating price favoritism for big business.

The bill will require sellers of any commodity to make known to all customers their quantity discounts, prices and other terms and make these terms available under the same conditions to all buyers.

Coal Production in France Now Exceeds 1938 Monthly Average

Supply still inadequate. United States supplying bulk of imports; 3,521,350 tons shipped during first eight months. Output of steel and pig iron gaining. In Belgium, shortage of metallurgical coke limiting steel output

PARIS

AUGUST coal output in France was higher than the average monthly output in 1938 and amounted to 4,165,000 metric tons, compared with the 1938 average of 3,964,000 tons. Imports in August also reached the highest point since the beginning of the year with 1,188,455 tons, so that the resources of coal for the French requirements were a postwar record with 5,353,455 tons. Taking together domestic production and imports, supplies of coal in August were only 4 per cent below the monthly average of 1938.

Considerable changes are noticeable in regard to the source of imports. In 1938 average monthly imports from Great Britain were 539,700 tons, as against 36,103 tons in August this year. Belgium and Holland together supplied an average of 553,700 tons in 1938, as against 28,260 tons last August. From the Ruhr the figures were 419,500 tons and 206,000 tons, respectively. These deficiencies have been made up by the United States which sent 712,913 tons of coal in August this year, and 3,521,350 tons since the beginning of 1946.

Iron and Steel Output Rises

Production of iron ore in France during July was 1,392,000 tons, compared with 1,289,000 tons in June. Output of pig iron in July was 303,000 tons, as against 268,000 tons in June, and output of steel ingots and castings was 378,000 tons in July and 343,000 tons in June. The production of rolled products in July was 251,000 tons, against 236,000 tons in June.

In July the French automobile factories produced 2709 private cars and 6019 commercial vehicles.

In Belgium, as in France, the shortage of metallurgical coke impedes the expansion of iron and steel production. About half the number of blast furnaces that were active in 1939 are in operation. Iron ore from Lorraine is arriving in sufficient quantities, but steel scrap is short, especially for open-hearth furnaces. Sambre at Moselle is on the point of restarting its works at Chatelineau for production of light and medium sheets. Usines Metallurgiques du Hainaut is proceeding with the modernization of its plant mainly for the production of pig iron and steel, and is investing considerable capital in this direction.

Output statistics for recent months in Belgium follow:

	May	June	July
		(Metric Tons)	
Basic pig iron	160,507	159,565	179,337
Special grades	15,007	12,847	14,577
Basic bess. steel	147,516	148 032	168,456
Open hearth steel	29,121	30 400	29 381
Electric steel	1,358	1,644	1,830
Finished steel	153,292	160,812	174,528

Luxemburg produced 123,857 tons of pig iron in July, as against 111,250 tons in June, the average monthly in 1938 being 129,225. Steel output in July was 118,027 metric tons, as against 104,336 tons in June and an average monthly of 119,700 tons in 1938.

Export market for Belgium and Luxemburg is gradually becoming more active, most of the transactions being controlled by the government and balanced by imports of goods required by Belgium and Luxemburg. Prices are consequently a matter of bargaining between governments and do not necessarily represent the actual value of the goods exchanged.

A commercial agreement has recently been arranged with Uruguay, providing for the export of 50,000 tons of Belgian and Luxemburgian rolled steel products.

The following tonnages have been exported during the first six months of 1946 from Belgium and Luxemburg (metric tons):

Blooms and sheet bars	4,178
Billets	22,562
Structural and merchant steel	303,688
Rails	29,004
Plates and sheets	119,901
Wire rod	80,974
Wire	16,789
Hot drawn tubes	1,790
Cold drawn tubes	265

Total value of these exports was 2,150,633,000 Belgian francs ($48,878,000).

Brazilian Blast Furnace Is Near All Raw Materials

Production has now reached 200 tons a day at a small blast furnace, recently put in operation near Corumba, Matto Grosso, Brazil, according to reports from consular channels at Rio de Janeiro.

Iron ore for the furnace is being brought by truck from about 15 miles away; limestone for flux is supplied by a nearby deposit, and charcoal is prepared at the plant.

ILO CONFERENCE OPENS: Humphrey Mitchell, Canadian labor minister and president of the International Labor Office, addresses the 500 delegates at the opening of the 29th conference of ILO in Montreal. Mr. Mitchell stressed the need for the work of ILO in helping repair the moral, physical and financial destruction caused by the war. NEA photo

Wage Rise Averages 11½ Cents For All Workers Since V-J Day

Manufacturing hourly rate up 14½ cents but average for all workers, including those not affected by general changes, is lower. Advances of 18½ cents granted by plants employing one-third of manufacturing workers

GENERAL wage changes in manufacturing industries caused an average increase of about 14½ cents per hour in wage rates between V-J Day and May, 1946, according to Ewan Clague, Commissioner of Labor Statistics, U. S. Department of Labor.

When all workers are considered, including those not affected by general wage changes, the average gain amounted to about 11½ cents, Mr. Clague said.

In line with the pattern set in the 1946 steel case, advances of 18½ cents an hour or more were granted by plants employing almost one-third of all manufacturing workers who received general wage increases. About 20 per cent of the workers were affected by general increases of less than 10 cents, a similar proportion received 10 to 15 cents, and some 28 per cent received 15 to 18½ cents. Mr. Clague also observed that about one-fifth of all factory workers did not share in general upward wage adjustments during this period.

Among selected non-manufacturing industries, with the exception of the heat, light and power industry, comparatively few establishment-wide raises in hourly rates were reported. Where granted, the average gain for all trade, service, finance, and public utility establishments amounted to 8.4 cents per hour. Since many such workers were employed in establishments not participating in general wage advances, the over-all average for these industries amounted to somewhat less than 3½ cents per hour.

No general revisions in basic wage scales were indicated for almost half of the workers in wholesale trade and for an even higher proportion in other lines of service and trade.

The typical increase in each of the non-manufacturing groups was betwe 5 and 10 cents, except for the he light and power industry, in which t most frequent increase was 15 cents a the average, 14 cents.

A distribution of workers accordi to increases in basic wages rates shown in the accompanying table whi is based on reports from about 66 establishments. Only general or across-t board increases made at one time a affecting 10 per cent or more of t workers in an establishment were i cluded in this analysis.

After the closing date of this surv additional large wage increases we widely given in some textile industri notably cotton textiles and hosiery. Mor over, in some industries there probab has been some further upward moveme of wage rates as individual establis ments have granted their first or adc tional increases to bring them in li with industry or area patterns.

Collective Bargaining Trends Patterned on Public's Political and Economic Thinking

THAT political and economic developments will have increasingly significant effect in establishing and giving momentum in the major trends in collective bargaining is the opinion expressed Sept. 18 by C. L. Huston Jr., Coatesville, Pa., assistant to the president, Lukens Steel Co. and subsidiaries, speaking before the labor relations conference at Wichita, Kans.

Mr. Huston, who is chairman of the subcommittee to improve employee relations of the National Association of Manufacturers, sponsoring the conferenc declared "we readily note certain funda mental changes in public thinking whic may have a lasting impact on collectiv bargaining, more significant even tha current political or economic develop ments.

"It is a plain fact," he said, "that i dustrial collective bargaining in th United States has for some time bee no longer concerned primarily with wage hours, and working conditions, as the pertain solely to the operations of th

ESTIMATED PERCENTAGE DISTRIBUTION OF WORKERS IN ALL MANUFACTURING AND SELE RATES, AUG.

MANUFAC

Amount of increase (cents per hour)	Total †	Food and kindred products	Tobacco manufactures	Textile mill products	Apparel and allied products	Furniture and finished lumber products	Paper & allied products
Under 5	2.1	3.1	0.8	3.4	3.0	5.4	0.2
5 and under 6	5.5	10.5	15.4	2.2	3.0	24.1	5.1
6 and under 7	2.9	4.9	4.3	14.3	.6	4.9	..
7 and under 8	2.2	5.4	26.8	3.6	2.3	5.5	1.6
8 and under 9	4.0	2.3	*	10.7	7.0	9.0	5.6
9 and under 10	2.6	2.0	.8	7.4	3.6	22.2	.3
10 and under 11	10.8	16.8	21.3	15.1	20.3	20.9	11.5
11 and under 12	1.7	1.2	..	4.7	1.0	.2	..
12 and under 13	3.0	3.2	.7	2.9	6.6	1.3	.3
13 and under 14	2.3	.7	1.9	6.4	3.0	..	9.7
14 and under 15	2.3	.9	16.5	3.0	6.2	.9	6.0
15 and under 16	11.7	5.1	8.3	19.8	29.9	1.1	37.0
16 and under 17	4.6	29.0	.1	1.0	1.3	..	5.9
17 and under 18	3.3	2.7	.7	3.7	1.6	..	8.4
18 and under 18½	8.5	1.8	.1	.4	1.1	..	.5
18½ and under 19†	21.6	3.6	.2	*	*	4.3	7.9
19 and under 20	1.2	.3	.1	.5	.4	.2	..
20 and under 21	4.0	2.7	..	.1	2.1	..	..
21 and under 22	.9	1.2	..	..	.1	..	..
22 and under 23	.8	1.4	..	..	3.7	..	..
23 and under 24	.2	.1	.5	..	.1	..	..
24 and under 25	1.0	..	1.5	*	.6	..	..
25 and over	2.8	1.1	..	.5	2.5	*	..
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percent of all workers receiving no general wage increase	21.3	38.8	9.7	7.3	28.3	30.4	28.5

†Total includes the printing and publishing; lumber; and stone, clay and glass products industries for which separate data are not presented.
*Less than one-tenth of 1 percent.

individual plant office or company. Rather, innumerable factors beyond the scope of the individual concern exert a direct and positive bearing on the final outcome of local bargaining negotiations, and must be given careful consideration in the studied preparation for such negotiations.

Since the passage of the Wagner Act, Mr. Huston said, the administrative agency for carrying out the law has provided sympathetic, and, on many occasions, unbound encouragement to the gathering of employees into unions. It is worthy of special mention that whereas in 1920 there were little over 4 million union members in the country, the combined membership gained today by the CIO and AFL amounts to about 13 million persons without including the railroad brotherhoods and the independent union memberships which would add considerably to the over-all figure. Collective action in the industrial labor relations field is thus in effect on a national scale.

Public Interest Is Deciding Factor

Since the war, marked attention has been paid to "the public interest," Mr. Huston pointed out, and "we now find that if a decision or action is beneficial or at least not harmful to the public interest it is good and is accepted without question. If, on the other hand, the decision or action interferes with the welfare of any sizable portion of the population, it is considered bad and is, therefore, held up for public criticism.

"When years ago, large corporations combined to control certain lines of interstate commerce, the government passed laws to prevent development and maintenance of such consolidations as were considered harmful to the national good. Government representatives have since been diligent and persistent in the enforcement of the controlling statutes. Today the administration is embarrassed repeatedly to find that the comfort and welfare of large segments of the population are being interfered with by the strike actions of those unions whose growth has been encouraged by the government over many years. Infringement on private property rights has generally been winked at or overlooked whenever labor relations have been found to be involved. Only when strikes have resulted in discomfort, inconvenience or suffering to large numbers of people, have the national lawmakers become determined to find the necessary ways and means of curbing such questionably used power.

Labor Now on Trial

"The answer is not immediately in sight. Numerous laws have been proposed to Congress designed to curb the use of power by labor in a manner harmful to the public interest. Most of these are being held in abeyance to see how collective labor handles itself in the next several months. Too, many senators and congressmen, up for re-election this year, are fearful of labor's power in the nation's voting.

"Certain carefully thought-out proposals for amendments to the Wagner Act have been urged for consideration. Notable among these are the recommendations of Gerard D. Reilly, recently retired as a member of the National Labor Relations Board, who insists, 'if we are going to have collective bargaining within the framework of a capitalistic economy, we want to be sure that the dice aren't loaded on one side,' and he suggests in detail certain amendments to the Wagner Act which would enable it to be administered more fairly and impartially than is possible at the present time.

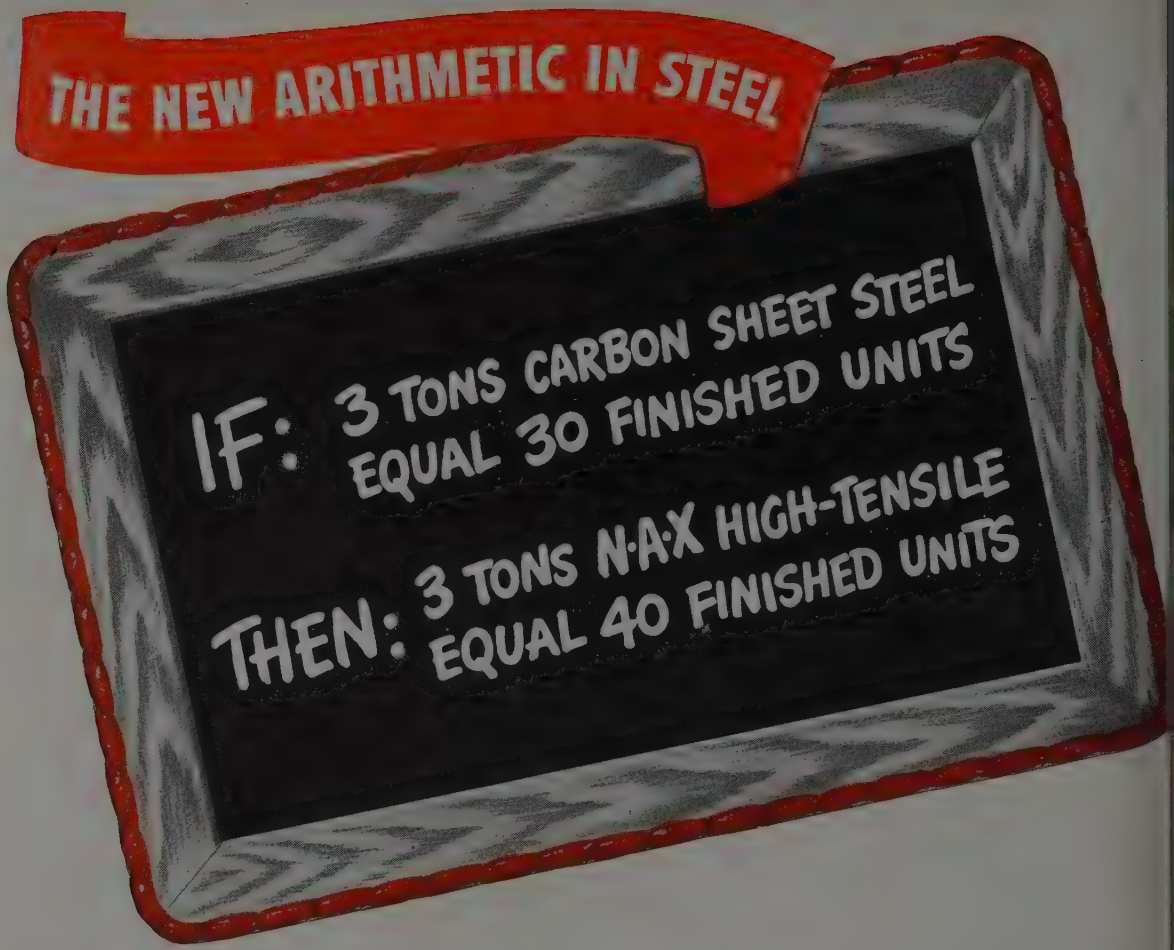
"From the foregoing, and regardless of what comes up in the way of new labor-curbing laws, or as to changes in existing labor laws, there is definitely a trend in public thinking in this country towards 'collectivism.' A study by the Opinion Research Corporation of Princeton, published in 1946 and entitled 'Collectivist Ideology in America,' reports that it is principally the workers of the country who are supplying the public opinion pressure for government regimentation. The document explains that, in spite of the fact that the great majority of our country's citizens believe in private competitive enterprise, and prefer our system to any other in the world, worker-thinking believes that only through intervention of the government backed by union pressure, will such benefits as job security, old age pensions, high wages, high standards of living, better housing, medical care for all, safety of savings, and help for the little man, be provided in the greatest measure to the largest number of people. It is a sad commentary that industrial hourly wage earners as a group—those who are unquestionably the principal beneficiaries of the fruits of industry—have become, apparently because of misunderstanding and lack of adequate communication between management and their own workers, the most prominent unit of collectivist thinkers in the nation," Mr. Huston said.

NMANUFACTURING INDUSTRIES ACCORDING TO AMOUNTS OF GENERAL INCREASES IN WAGE , TO MAY 1, 1946

TRIES

cts	leum	coal	Rubber products	Leather and leather products	Basic iron and steel	Ship-building	Metalworking (except basic iron and steel and shipbuilding)	Total	SELECTED NONMANUFACTURING INDUSTRIES				
									Wholesale trade	Retail trade	Finance, insurance & real estate	Heat, light and power	Service trades
		5	2.3	0.2	..	..	1.9	13.1	7.8	14.4	10.7	2.6	24.8
			1.0	.1	..	0.7	4.9	16.4	15.0	21.7	9.7	1.4	17.6
				.3	..	..	.8	10 5	11.3	10.4	2.8	.6	19.9
				8.1	..	..	1.1	10.4	16.3	9.4	13.4	2.1	6.8
			.1	30 9	..	..	1.2	7.7	5.6	6.9	25.7	.4	4.9
			.1	3.5	..	..	1.6	3.7	2.6	3.2	6.9	4.6	4.1
			*	5.5	0.1	..	8.2	17.1	22.2	19 6	9.9	12.9	10.6
				1.5	..	*	1.9	1.8	1.3	2.6	3.3	.4	.6
		1	2.6	9.5	..	..	2.6	3.5	1.4	2.6	6 0	8.8	4.1
			1 9	6.0	..	.2	1.4	1.8	.6	1.8	2.8	6 5	.2
			.8	2.2	..	..	2.2	3.1	2.5	2.0	1.3	15.0	1.7
		1	1.0	24.3	..	..	7.6	3.5	3.1	2.0	1.6	18 6	.8
		1	.6	3.9	..	..	1.1	1.2	.5	.8	.1	9 2	.1
			1.1	1.5	..	..	3.9	1.9	4.0	.6	.1	5.5	1.4
		3		2.6	..	90.8	13.1	.9	1.1	.1	3.7	2.4	*
		3	75 4	..	97.9	..	31.3	1.0	1.2	.2	.1	4.9	.9
		1		.2	..	3.3	1.2	.1	..	*	*	*	.2
		6	2.3	3.0	..	4.9	6.3	1.2	2.4	.3	.9	3.3	.5
		6	5.1	1.1	..	..	*	.1	.2	.2	..	..	.1
		8	..	.2	..	..	.9	.1	.	.1	.5	.3	*
		2	.	.	.	..	.1	.1	.1	*	..	.1	.2
		3	..	.	.	..	2.2	*	.1	*	.	.	*
		9	5.7	.1	2.0	.1	3.8	.8	.7	1.1	.5	.4	.5
		0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		5	2.9	12.5	1.9	17.0	18.4	59 2	18.4	63.6	61.9	4.1	67.9

With minor exceptions these are 18½-cent increases.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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

New car buyers yell loud and long over dealers' practice of loading on "extras". Manufacturers concerned over sellers' pressure tactics but are powerless to stop it. Solution lies in increasing production until edge is taken off frantic demand

DETROIT

POPULAR pastime among new car owners here—and there seem to be plenty of loquacious ones—is to compare notes on how badly they have been "given the business" by dealers intent on squeezing the last dollar out of the current seller's market. They will talk of how dozens of extras have been tacked onto their cars at considerable cost, even though unspecified. Whitewall wheels, fog lights, extra mirrors, windshield washer sprays, electric gas tank caps, vacuum radio aerials, corrosion proof paint sprayed on underbodies, seat covers, cigar lighters—almost everything but venetian blinds and flower vases—are being tacked onto many new models and they bring loud screams from owners who are quick to pass the stories along, often with considerable succeeding amplification.

One of the weirdest cases to come to this observer's attention was that of a buyer of a car in the $1300 price class, who was billed for $489 worth of extras, including, of all things, a charge for eight lubrication jobs which the customer doubtless was supposed to have had done at intervals in the future when required.

Protest Low Trade-In Allowances

It is not only on the subject of extras that the howls are developing . . . low allowances on trade-ins supply other tall tales. Where dealers before the war would trade away 6-8 per cent of their 24 per cent markup, they now receive the full discount and then buy in used cars at $500-$600 under the ceiling price, then either peddle them to used car lots or recondition them for sale at the warranty ceiling which is a couple of hundred dollars over the owner's ceiling.

Of course, it is true that satisfied owners seldom have anything more to say after they take delivery of their cars, so the complaints now being heard are probably from only a small proportion of all buyers, but at least they are so vociferous and frequently repeated that automobile company officials are taking cognizance by sounding a soft note of warning to their dealer organizations.

Thus, Frank Denney of Lincoln-Mercury told a group of dealers recently, "The victims of unethical practices will long remember and never forgive the individual dealers who inflict injustices on them. The same dealers who are congratulating themselves today on what they call shrewd business sense and business acumen may find themselves not too popular in places where they were once welcome and respected." He prefaced his remarks by pointing out that "money-hungry operations" could be laid at the door of only a very small percentage of dealers, but the harm they cause may be deflected in part to all dealers and in the long run to the industry as well.

Automobile Production

Passenger Cars and Trucks—U.S. and Canada

Tabulated by Ward's Automotive Reports

	1946	1941
January	121,861	524,037
February	83,841	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,321
June	214,511*	646,278
July	330,764*	468,897
August	364,046*	164,793
Estimates for week ended:		
Sept. 7	72,535	32,940
Sept. 14	88,888	53,165
Sept. 21	81,162	60,615
Sept. 28	90,000	77,035

* Preliminary

On the other hand, Don Bathrick of Pontiac dismisses stories of cars being overloaded with accessories, by pointing out that the supply of car heaters is less than 70 per cent of requirements, and cars for the West and South are being shipped without them. Electric clocks, he says, are in 55 per cent supply and accessory bumper guards 25 per cent, while only 50 per cent of the required fog and spot lights are available, and 10 per cent of production is being equipped with automatic windshield washing devices and rear window wipers. Other than heaters and radios, it might be questioned just what Bathrick considers full requirements of 100 per cent supply. Obviously many dealers like to install these gadgets since they realize a handsome profit on them, but the real measure of demand is not what dealers would like but what the actual buyers want installed.

Privately, more than a little concern is being expressed by automotive executives over these pressure tactics of some of their dealers. They realize the damage being done to both dealer groups and to manufacturers but they confess they are virtually powerless to exercise any police powers except the cancellation of franchises, and this is a distasteful business. Part of the blame of course rests on buyers who are willing to pay any price and accept any or all accessories just to get their new cars. The remedy is simply more production and more production, until the frantic moods of both buyer and seller are tempered.

Union Assails Inventory Position

Inventory position of the automotive industry on materials and parts has been seized upon by the UAW-CIO as a reason why any further price increases should be denied. With an obvious scant knowledge of accustomed accounting practice, the union charges the value of inventories of materials and parts in the hands of major auto corporations has increased by over $200 million since the first of the year, bringing the industry index of inventories to 230 per cent of the 1939 average . . . further that all of this increase has been charged off to costs in the first six months of the year, leaving no materials charges to be levied against production in the latter half of the year and therefore making any price increase unjustified.

Unquestionably, inventories have been built up enormously over the past nine months, on many parts being two to three times the normal float. Reasons are twofold: First, they were based on a production level far ahead of that yet attained, and second as a cushion against the disastrous interruptive effects of strikes in suppliers' plants. However, it is just not conceivable that inventories accumulated in the first half could be charged off against manufacturing costs in that period. Tax regulations alone would appear to rule this out, since if it were possible, a company could build up such a large inventory bank this year, then charge the entire bill against 1946 production to show large losses when part of the materials bill could be legitimately charged only against next year's

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TRUCK OUTPUT EXCEEDS PREWAR: Delivery of new Chevrolet trucks is being accelerated to meet unprecedented demand from business and industry as evidenced by this photo of vehicles awaiting shipment from the Chevrolet plant at St. Louis. During July and August, Chevrolet truck shipments exceeded the volume for the same months in 1941

production, assuming a large carryover of inventories from this year. The internal revenue department would scarcely countenance such a procedure.

Certainly on raw materials like flat-rolled steel, pig iron, steel wire, copper, lead and many other items inventories cannot be too comfortable or production would have increased over the past few months instead of just about holding its own. Nevertheless, for its own part, the industry has maintained a stony silence over the union allegations.

Willys To Disclose New Line

Wednesday of this week Willys-Overland will disclose its line of utility and passenger vehicles, along with a plan for an approach to present-day economic problems at a meeting of 400 industrialists, public officials and editors at the company plant in Toledo, O. Master models of three lines of trucks which are to be produced within the next two months will be on display, as will the 6-cylinder passenger car slated for 1947 production. Supplementing the automotive exhibit will be what is described as a "graphic exhibit which will present a three-dimensional concept of the fundamental economic laws which govern U. S. business."

Commenting on economic problems of the day, James D. Mooney, Willys-Overland president, says: "People are talking instead of working. Labor, management and government are all so busy arguing about their various viewpoints and statistics that nobody has a chance to see that we are all in the same boat. We are sitting in a becalmed boat arguing about what caused the wind to die down, where it comes from, where it went, when it is coming back, whose job it is to make it come back—instead of just taking hold of the oars and doing a little hard rowing to get back to the shore before we all suffer from thirst, hunger and exposure to the economic elements that make up the atmosphere we all live in, whether we know it or not."

Crusoe Rises at Ford

Elevation of Lewis D. Crusoe to a high position in the executive ranks in Ford Motor Co. was not long in coming, announcement having been made last week of his appointment as director of a new planning and control division. Crusoe, it will be recalled, served with the Fisher Brothers and the Fisher Body Division of General Motors for 32 years, principally as comptroller, leaving in 1944 to become assistant to E. R. Breech at Bendix Aviation. After Breech joined Ford as executive vice president, he brought Crusoe to the Rouge administrative family and he now will head up a division comprising a planning office and a controller's office which will include all components of the present controller's organization except the tax division, which is transferred to the treasurer's office. The new unit takes its place among major staff divisions of the company, functioning on the same level as industrial relations, engineering, purchasing, manufacturing, sales and advertising and finance divisions.

UAW Guns for Foundries

The UAW-CIO is now training its guns on the nation's foundries, announcing a national foundry conference to be convened Dec. 7-8 in Milwaukee for the express purpose of launching an industry-wide campaign to improve wages and working conditions for 100,000 foundry workers. Sounding the call, R. J. Thomas has unloaded some of his choicest invectives against the foundry-industry—"Intolerable working conditions... dirtiest and most dangerous work. . . inhuman disregard of elementary safety precautions both in captive and jobbing foundries."

Behind this abject sympathy for the poor foundry workers, Thomas reveals what is perhaps the primary purpose of the campaign when he calls for industry-wide wage equalization to prevent "thousands of jobs being moved out of the organized plants with relatively high wages into low-wage outfits throughout the country." Thomas heads the competitive shop department of the union and has initiated similar wage conferences for other divisions of the automotive industry.

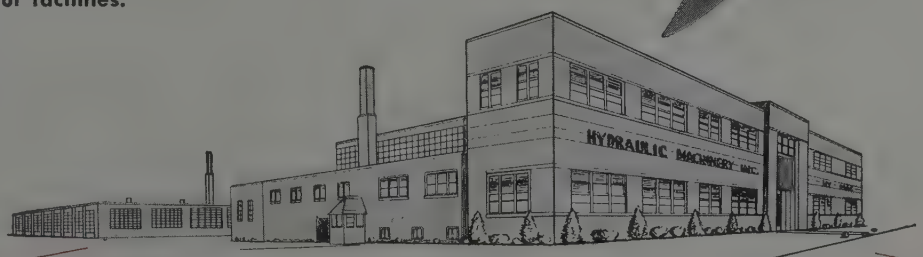
Why Briggs Was Struck

Believe it or not, the incident which touched off the recent Briggs strike here and resulted in several days of idleness for 50,000 in Chrysler and Packard plants was simply this: In the presence of the Briggs general manufacturing manager, his assistant and the factory manager, a chief steward in the Outer Drive press plant told employees on the production line to stop work because his request for reclassification of one operation and the reassignment of the operator had not been complied with. They did, the steward was fired and the men walked out. Return to work came several days later after a proposal to arbitrate the dispute, but there is evidence to support the belief Briggs officials are going to exert strong efforts to make the discharge stick, since such arbitrary and communistic actions as stopping a production line, in complete defiance of contract provisions, sooner or later are going to have to disappear from the Detroit scene.

Just off the press

this new book will tell you all about it

All about Hy-Mac hydraulic Power Units, that can be applied to drilling, grinding, milling, boring, piercing, riveting, broaching, pressing and special applications . . . just determine the functions of the machines that are to be hydraulically operated—and our engineers will recommend a Power Unit and a layout of circuits to best do the job . . . a request on your letterhead will bring a copy of this twelve-page brochure that outlines our facilities.



HYDRAULIC MACHINERY, INC.

12825 FORD ROAD | **Dearborn, Michigan**

WESTERN DIVISION — **GLENDALE, CALIFORNIA**

Continued Need For Producer Goods Is Seen

Blaw-Knox Co. officials at annual meeting emphasize importance of increasing supply of production machinery

URGENT NEED for producer goods and for American-engineered industrial and construction machinery and equipment will continue for some time, William P. Witherow, president, Blaw-Knox Co., Pittsburgh, declared at the company's annual sales meeting recently.

"Engineering manufacturers of production machinery and equipment," Mr. Witherow emphasized, "have a vital responsibility during these days of material shortages in meeting this critical need."

Sales engineers, production men, engineering staff members and department heads, including representatives of the company's overseas staff and all district offices, a total of more than 300 people, attended this first postwar meeting and dinner.

Chester H. Lehman, executive vice president, discussed the company's sales program and pointed out the need for a high type of sales engineering service to industrial and construction consumers. "Our sales staff today must assume some of the functions of purchasing agents and application engineers in the effort to meet urgent needs," Mr. Lehman asserted. "It is important that our sales organization, with the full assistance of our engineering staff, bring to our customers the latest procedures involving the use of construction and industrial machinery and equipment," Mr. Lehman told the assembled personnel.

New Firm Making Broaching Machines, Tools Organized

Acme Broach Corp., Lexington, Ky., recently organized, has begun production of broaching machines and tools in its new plant at East Third St. and Delaware. The company, headed by E. J. Lapointe, president, currently is producing hydraulic presses for broaching, assembling, forcing and straightening; keyway and four-jaw broach pullers; standard keyway broaches; and horizontal hydraulic broaching machines. Additions to the company's line of machines and tools is contemplated sometime in the future.

CITED BY NAVY: For their research and development of the .50 caliber machine gun mount and submarine detecting devices these members of the Heintz Mfg. Co. have been cited by the Navy Department. Left to right: W. H. D'Ardenne, A. W. Barndt, Wm. A. Myers, Weber deVore, M. J. Fisher, Wm. J Meinel, A. L. Lambert, J. M. Ward, Robt. J. Meili and Ben Peter

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Babcock & Wilcox Tube Co., Beaver Falls, Pa., has purchased the welded boiler tubing plant at Alliance, O., which it operated during the war from War Assets Administration for about $1,315,000.

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Sol H. Friedman Co., Cleveland, has changed the name of its Detroit warehouse to Solar Steel Corp.

—o—

Borg-Warner Corp., Chicago, has purchased from War Assets Administration for approximately $1,500,000 the manufacturing plant in Milwaukee county, Wis., operated during the war by A. O. Smith Corp., Milwaukee. The facility will be used by Borg-Warner's newly formed Wisconsin Transmission Division.

—o—

Fisher Body Division, Cleveland plant, celebrated its 25th anniversary on Sept. 26 and 27 with an open house program and a special tribute to employees with 25 or more years' service with the company.

—o—

H. K. Ferguson Co., New York, has been awarded contracts covering design, purchasing and construction supervision for a new chlorine plant for Delhi Cloth & General Mills Co. Ltd., at Delhi, India.

—o—

Torq Electric Mfg. Co., Cleveland, and Torq Properties Inc., Cleveland, have been incorporated under the name Torq Electric Corp. and are now building a new plant at Bedford, O., where production of fractional-horsepower motors will be stepped up. The company manufactures electric motors and special industrial machinery, such as presses, furnace chargers and lift trucks.

—o—

Home Concrete Block Machine Co., Hickory, N. C., has changed its name to Concrete Machinery Co.

—o—

Industrial Hygiene Foundation, Pittsburgh, has organized a new professional committee on chemistry and toxicology which will be headed by Henry F. Smyth Jr., Ph. D., senior fellow of Mellon Institute, Pittsburgh.

—o—

Westinghouse Electric Corp., Pittsburgh, is using transparent plastic models of machine bearings to determine how effectively the bearings are lubricated while in operation.

—o—

York Corp., York, Pa., has developed two models of frozen food cabinets for hotels, hospitals, farms, etc. The units have capacities of 33 cubic feet and 16¼ cubic feet.

—o—

Galvin Mfg. Corp., Chicago, has leased for five years a 5-story plant at 1325

West Washington Blvd., that city, where it will produce a new automobile heater.

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Sutton Engineering Co., Pittsburgh, has installed equipment for case hardening large diameter rolls. This equipment will accommodate diameters up to 20 in. and lengths up to 40 in.

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Reynolds Metals Co., Richmond, Va., has announced a home freezer unit which is the first item in a line of refrigerating equipment which the company will produce.

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Chicago Precision Machine Co., Chicago, has developed a new portable electric arc welder, which is specially designed for light duty welding on farms, home workshops, etc.

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Fairbanks, Morse & Co., Chicago, has received an order for an 8000-hp diesel-electric locomotive, which will be over 259 ft long and with supplies will weigh approximately 1,250,000 pounds.

Perfect Circle Co. Split Into Two New Companies

Reorganization of Perfect Circle Co., Hagerstown, Ind., was authorized by the company's stockholders at a recent meeting, and as a result two companies will be formed—Perfect Circle Corp., with an authorized capital of 650,000 shares of $2 par value common stock, to engage in the business now carried on by Perfect Circle Co.; and Cartonic Corp., with an authorized capital of 162,500 shares of $2 par value common stock, to produce other products allied to the automotive supply field.

Perfect Circle Co. will be dissolved under the reorganization, although for the time being little or no change in the company's personnel is contemplated.

The status of Perfect Circle Co. Ltd., a Canadian company, will remain unchanged.

Heating Systems Designer Moves and Changes Name

Rapid growth characterizes Industrial Ovens Inc., a Cleveland concern which until recently was named Industrial Oven Engineering Co. The company has grown from an organization of five people in 1940 until now it employs 42 in its engineering department alone. Coincident with announcing its new name the company has also opened its new plant and office at 13825 Triskett Rd., Cleveland 11.

Specializing in engineering, designing and installing industrial heating and processing equipment, with particular accent on continuous operations in handling of materials to be treated, the company has installed its systems in the rubber, wire, textile, and plastic film industries as well as in many others. Its installations are now being widely used in several foreign countries as well.

Stainless Steel Producer Expands, Adds Equipment

Eastern Stainless Steel Corp., Baltimore, producer of stainless steel sheets, is reported to have lifted its output to approximately 20 per cent of the national total as a result of its current expansion program. Output will be further increased before the end of the year by installation of nine additional polishing machines, the structural housing for which is almost completed. A new 45-inch 4-high mill, which will double the plant's cold rolling capacity, began production in August. Added annealing capacity of 1500 tons per month has been provided by two new annealing furnaces, and an additional pickling unit is being installed.

Sharon Steel Will Acquire Detroit Mill

Acquisition of cold finishing mill of Bopp Steel Corp. will provide Sharon an outlet for semifinished steel

SHARON STEEL Corp., Sharon, Pa., has completed plans to acquire the Bopp Steel Corp.'s cold finishing mill at Detroit.

The acquisition, which will be made through an exchange of securities, will give Sharon Steel a finishing unit that will take 60,000 tons of its hot-rolled strip yearly and will strengthen Sharon's position in the Detroit market.

The acquisition is part of Sharon's policy of expanding its finishing facilities to use its entire production of semifinished steel. The Bopp plant is located near the Detroit Seamless Steel Tube Co., a wholly owned subsidiary of Sharon.

EXPORT HAND TRUCKS: Part of the first carload shipment of Transporter motorized hand trucks to Argentina is shown being assembled for shipment from the Automatic Transportation Co. plant in Chicago. The shipment marks the beginning of expanded imports of American-made equipment to mechanize the movement of materials in Argentine industry

Fabricator Starts Pipeline Project

Large diameter pipe fabricated by Consolidated company from plates produced at Geneva, Utah. Plant operates on mass production basis

SAN FRANCISCO

FIRST fruits of peacetime operation of the Geneva steel mill in Utah are starting to appear.

Using 30-ft plates rolled by the Geneva plant, Consolidated Steel Corp. has started operation of a new continuous steel pipe fabrication mill to produce large diameter pipe for a gas pipeline which will be laid between California and Texas. This operation is the first of its kind on the West Coast, and is located in southern California.

Consolidated Steel has a $6 million contract to furnish—to Southern California Gas Co. and Southern Counties Gas Co.—214 miles of 30-in. outside diameter arc-welded steel pipe.

The mill which will produce this pipe is designed to operate on a mass production basis, with fabrication passing through an "assembly line" of about a dozen steps. Output will be at the maximum rate of one 30-ft long section every 4½ min., or about nine miles of pipe a week. To complete the 214-mile line, 38,000 sections will be needed.

In its operation, Consolidated is using this fabricating method: Plates are trimmed and finished, then curved into shape in a pair of pyramid rolls. Edges are welded in five electric arc welders. The pipe sections are then expanded hydraulically in pressure expansion molds to bring them to the right diameter. They are shaped accurately, and welds are tested under pressure. For shipping purposes, sections are welded into 60-ft lengths, coated and wrapped with 15-lb asbestos.

A factor which makes this pipeline different from most is that as the line moves westward, thickness of the steel pipe will be reduced. Southern California Gas Co. has been using this method in its one-way lines for 15 years, thus saving a large tonnage of steel. A saving of more than 7400 tons of steel costing $600,000 will be accomplished by this method on the present contract. In order to make this possible, pressure limiting stations will be installed along the line to reduce the amount of gas pressure at intervals, thereby making thinner gage pipe feasible.

Another result of peacetime resumption of output by the Geneva mill is establishment of the first of the satellite plants which are expected to spring up around the Geneva installation.

Besser Mfg. Co., a Michigan company, will establish a branch plant in Salt Lake City for production of machinery used to make concrete blocks. Steel for making its product will be obtained from Geneva.

MAGNESIUM TRUCK-TRAIN: Permanente Metals Co. recently brought out this light-weight, magnesium trailer and semi trailer, 60 feet long, to haul cement. Company claims it will carry an extra payload of 6000 pounds. NEA photo

California Consumers Press For Steel Supply Relief

Continuing efforts to relieve the desperate steel shortage in the San Francisco and northern California area, 17 congressmen representing the California delegation in the House of Representatives have urged President Truman and other government officials to take steps to increase steel deliveries.

In their message, the congressmen said "California is confronted with an acute shortage of steel sheets and strips which threatens to compel all manufacturers and fabricators of sheet metal products to shut down plants in the immediate future.

"We urgently request issuance of directives to steel mills of the East and Middle West to deliver a sufficient proportion of their output to meet minimum needs of the West Coast.

"Warehouse inventories have been reduced to zero and current receipts are one-tenth of normal."

Unemployment Insurance Claims Drop Off In California with Fraud Probe Pressed

LOS ANGELES

CLAIMS for unemployment insurance in California are being reduced 30 per cent faster than in the United States as a whole, Alvin E. Hewitt, executive vice president, California Manufacturers Association, reported last week.

The reduction, he said in a talk before the Los Angeles Rotary Club, is due in part to a campaign led by the association against unqualified persons accepting unemployment insurance.

"The State Employment Stabilization Commission," Mr. Hewitt said, "is investigating 1178 cases of fraud or alleged fraud on the part of claimants for insurance. The number of fraud convictions has gone up some 200 per cent since the campaign began."

He reported that the USES is reinterviewing and reclassifying individuals in various categories. In one office, for example, a large group originally labeled truck drivers is being reduced by reclassification into more accurate skill groups such as hand truck operators, car loaders, warehouse labor, helpers, etc.

Great expansion of southern California commerce, both in foreign and domestic markets, is inevitable, Alfred Schindler, Undersecretary of Commerce, said here last week.

He made the comment in reviewing the recent creation of a regional office of the department in Los Angeles.

"Expansion possibilities are greater here than in any other part of the nation," he declared, pointing out that the Department of Commerce program to aid business and industry is expanding also a

that the southern California office is but one of 75 such headquarters being opened over the nation.

He said that the government plan is to help business on a triple-point basis; first, to supply data on markets and trends; second, to provide general aids and services and, third, to provide technological guidance.

"Too many Americans are firm believers in the basic New Deal philosophy of scarcity, which used to be called something for nothing," DeWitt Emery, Akron, O., president, National Small Businessmen's Association, told a regional meeting of the organization here last week.

"This thinking has led us into a blind, senseless, headlong rush toward state socialism," he continued. "The trend must be halted and reversed, or business, large and small, is doomed.

"This dominant philosophy is plain silly. If this something-for-nothing idea was carried to its ultimate conclusion it would mean that at some future date everyone would have everything while producing nothing. This is what is being offered as a substitute for hard work and thrift."

Mr. Emery read from page 521 of a War Department education manual during one phase of his address. From it he quoted arguments against amassing of estates and in favor of laws which would tax income-producing inheritance properties so heavily as to leave virtually nothing except keepsake articles.

"This is the sort of stuff that too many people believe in," he said. "They think Utopia can be achieved by writing a description of it in a government pamphlet."

The American system of competition and the assembly line methods developed in the United States are the answer to talk about Communism, Socialism, Fascism and the like, Henry J. Kaiser told Los Angeles newspapermen last week.

"The great masses of people know how they want to be governed," Mr. Kaiser said. "How they will live will be decided by competition. If, for instance, we can give them better and cheaper homes, then ours is the best system, isn't it?"

Kaiser To Seek Government Aid in Enlarging Fontana

Henry J. Kaiser has announced his intention to seek $30 million from the government to be used for expansion of the Fontana steel mill. He proposes to spend the money on installation of hot and cold rolled sheet facilities. Eventually, he says, the Fontana mill hopes to produce tin plate. The new mill could be put in operation in about 18 months, he believes.

Fontana now is producing more tonnage than in wartime, Mr. Kaiser said, and its facilities are booked through 1947.

Aircraft Plant Employment Far Above Prewar Level at Seattle

Expectations are Boeing payroll will be more than five times previous peacetime highs by April of 1947. Economic effect of Columbia Basin development on area stressed. Krug says Northwest faces power shortage

SEATTLE

EMPLOYMENT is steadily climbing at the Seattle plants of Boeing Aircraft Co., it being estimated that by April, 1947, the payroll will be 16,000, nearly double the payroll of last April and more than five times previous highs in peacetime.

The company had 34,000 workers during the war, 23,000 in the main plant here, 6500 at Renton and 4000 in smaller shops in this area.

Prior to war production, the payroll numbered 3000 in 1939. The current payroll is 10,400 and it is expected to rise to 13,500 by the end of the year.

Pending contracts include the 80-passenger, double-deck Stratocruiser, the B-50 Superfortress and the C-97 army transport.

Principal speaker at the session of the National Security Traders' Association here recently, Robert S. Macfarlane, vice president, Northern Pacific Railway and president, Seattle Chamber of Commerce, predicted an ultimate population of 500,000 within the area of the Columbia Basin project, adding that the 17,000 farm units of the completed program would be equivalent to bringing a new farm state into the union.

He emphasized the need of increased food production, both regional and national, and stressed the economic effect of the Columbia Basin development on the Pacific Northwest. As the timber, fisheries and mining industries pass their peak, it is necessary to increase manufacturing and agricultural activities in the area. He stated that when the one million acres of the Basin are irrigated and under cultivation the volume and value of these farm products will equal that of the 25,000 farms in Utah, 38,000 in Maine and 61,000 in Oregon.

The national shortage of food and fiber products, he asserted, would be met by the production of the new Washington state area.

He mentioned the country's population increase of 38 million since 1920, requiring an additional 93 million acres of crop land whereas in the same period only 10 million acres have been brought under cultivation.

The entire Columbia Basin project, including dam and power installations, represents an investment of $400 million. Except for flood control and navigation costs assumed by the government, the dam and power plants are to be paid for by power revenues in 50 years and the irrigation system by levies on water and power users.

In the opinion of Secretary of the Interior J. A. Krug an imminent power shortage faces the Pacific Northwest, making it mandatory that additional generators be installed at Grand Coulee as quickly as possible. In announcing delivery of 140,000 kw of Coulee-Bonneville power to the Reynolds Metals Co. aluminum pig plant at Troutdale, Oreg., he stated that increasing power demands will utilize virtually all surplus power now available, adding that Bonneville's transmission system is critically overloaded in some areas. According to Administrator Paul J. Raver, the region is in the same position as during the war when power reserves were practically nonexistent.

"If industrial and general economic development of the region is to continue," he added, "we must not delay installing additional facilities at existing dams and speed construction of additional dams for power generation and supplemental water storage.

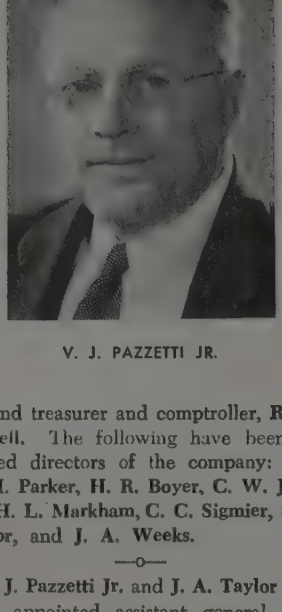
Reynolds is taking power at the Troutdale plant under a 10-year contract. Reopening of this plant leaves but one of the area's war-born aluminum plants idle, that at Tacoma operated by the Olin Corp. for the government during the war. Bids on this facility have been submitted by Reynolds, Kaiser and the Eastern Metals Corp. It also brings to 623,000 kws the committed aluminum power load of Bonneville compared with 686,300 kws of peak deliveries during the war period.

At a public hearing held at Portland by the Oregon and Washington state utilities commissioners doubts were cast upon the power shortages anticipated by Bonneville officials. The matter under consideration was the proposed merger of Northwestern Electric and Pacific Power & Light Co.

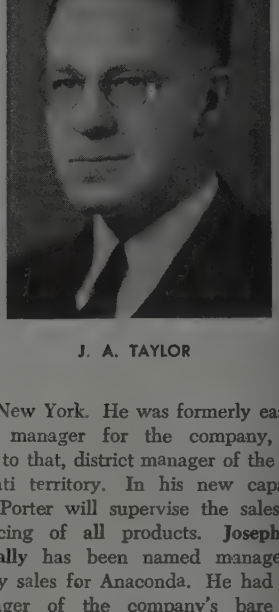
"I have not heard of any shortage," testified W. T. Neill, vice president of P. P. & L., "except to the extent that we've been asked by Bonneville to get our steam plants ready."

Men of Industry

A. W. LOVELL



V. J. PAZZETTI JR.



J. A. TAYLOR

Allen W. Lovell has been appointed general manager, Modern Collet & Machine Co., Ecorse, Mich. He joined the company in 1944, as sales manager. In addition to his sales duties, Mr. Lovell had full charge of production and development work at Modern Collet for more than a year, and since last February has served as consultant for the War Assets Administration in the disposal of surplus government-owned screw machines. **Henry Hillerman** has succeeded Mr. Lovell as sales manager. Mr. Hillerman had been in the screw machine production field until 1943, when he joined the sales force of Modern Collet and was assigned to all of the Michigan territory except Detroit and Pontiac. He now has full supervision of all the company's sales activities.

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Norbert C. Rubin has been named vice president in charge of sales, and **William J. Kerr**, vice president in charge of production, Yoder Co., Cleveland. Mr. Rubin had been sales manager for the company, and Mr. Kerr, factory manager. Prior to Mr. Rubin's new appointment, he played an important role in development of Yoder's postwar plan for expansion in the field of special metalworking machinery. His new position is expected to facilitate his collaboration with **John I. Lucas**, president of the firm, in execution of the program. Mr. Rubin has been with the company since 1939. Mr. Kerr joined the Yoder firm in 1936, as production manager. He had been factory manager since 1941.

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The following have been re-elected officers of Parker Appliance Co., Cleveland: Chairman of the board, **H. I. Markham**; president, **S. B. Taylor**; vice president and secretary, **C. H. Wagner Jr.**; and treasurer and comptroller, **R. W. Cornell**. The following have been re-elected directors of the company: **Mrs. H. M. Parker, H. R. Boyer, C. W. Johnson, H. L. Markham, C. C. Sigmier, S. B. Taylor**, and **J. A. Weeks.**

—o—

V. J. Pazzetti Jr. and **J. A. Taylor** have been appointed assistant general managers of the Bethlehem, Pa., plant, Bethlehem Steel Co., succeeding **A. D. Shankland** who has been transferred to the staff of **Quincy Bent**, vice president. Mr. Pazzetti joined Bethlehem in 1913. In 1922, he was made superintendent of Nos. 2 and 4 open hearths, and in 1936, superintendent of the Saucon Division. Mr. Taylor has been with the company since 1924. In 1938, he became superintendent of the forge specialty department, and in 1942, superintendent of the lower manufacturing shops. He had been chief engineer since 1945. Mr. Shankland joined Bethlehem in 1914, and became superintendent of the Alloy & Tool Steel Division in 1928. In 1934, he became engineer of tests, and in 1945, assistant general manager. **S. D. Gladding** has been appointed superintendent of the Saucon Division, and will be succeeded as superintendent of the Alloy & Tool Steel Division by **Ralph E. Knerr**, who was assistant superintendent. Mr. Gladding joined the company in 1914, and had been superintendent of the Alloy & Tool Steel Division since 1934. Mr. Knerr joined Bethlehem in 1920. **J. A. Bell** succeeds Mr. Taylor as chief engineer. Mr. Bell joined the company in 1906, and had been assistant chief engineer since 1945.

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C. H. Porter has been appointed manager of industrial, wholesaler and contractor sales, Anaconda Wire & Cable Co., New York. He was formerly easter sales manager for the company, an prior to that, district manager of the Cin cinnati territory. In his new capacit Mr. Porter will supervise the sales an servicing of all products. **Joseph W Mullally** has been named manager c utility sales for Anaconda. He had bee manager of the company's bare an weatherproof sales. Prior to that, h served as district manager at Pittsburgl During the war, on loan to the goverr ment, he served for 3 years as chief c the wire mill branch, Copper Divisior War Production Board. In his new pos tion, Mr. Mullally will supervise and co ordinate sales of all the company's prod ucts to power and light systems and t the railroad and communication indus tries.

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Dr. Cloyd Heck Marvin, president o George Washington University, Wash ington, has been appointed deputy d rector of the War Department's new Re search & Development Division. He wi co-operate closely with **Maj. Gen. Rober S. Aurand**, director, in directing the divi sion's extensive program in the field c scientific research and development. Th appointment was made in part in rec ognition of Dr. Marvin's contribution in the development of the atomic bomb

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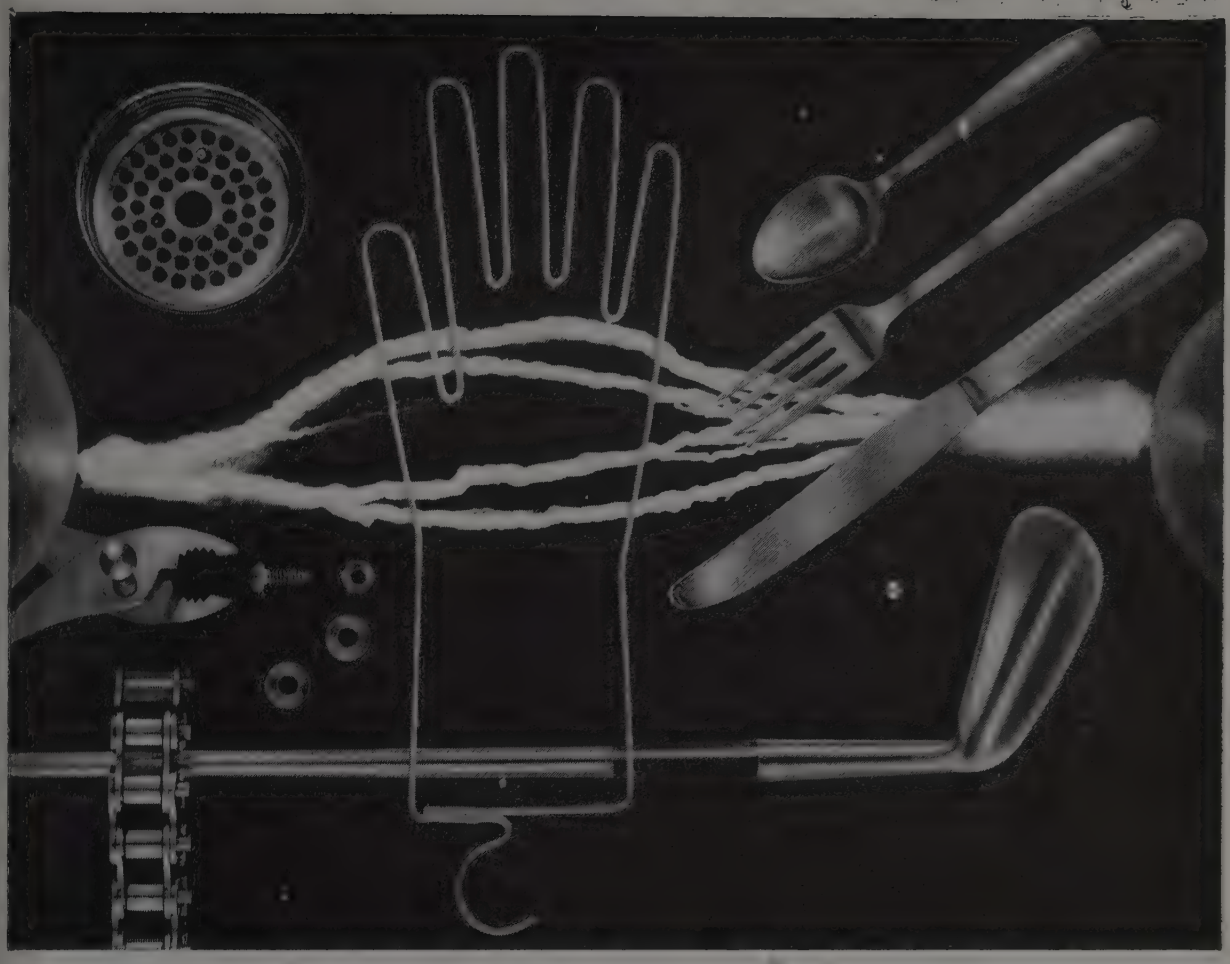
Walker Penfield, manager of manu facturing, Pennsylvania Salt Mfg. Co Philadelphia, has sailed for Europe fo a 2-month visit of chemical companies i England, France and Denmark. He wi be joined later at the Cryolite Co. i Copenhagen, Denmark, by **Cyril Hay ward**, chief chemist of the Pennsalt plan at Natrona, Pa. The trip is being mad for the purpose of studying new manu facturing processes, and for exchange o



Electricity Scrubs Stainless Steel Behind The Ears

Stainless Steel is a naturally beautiful and rustless metal—all the way through. Yet behind the gleaming finish on many products made of Stainless there's an interesting story.

Small, irregularly shaped articles could not be polished by the same methods as broad, flat surfaces. Mechanical polishing could not reach their deep recesses. So manufacturers were unable to make a wide variety of Stainless articles until a simple, inexpensive polishing process was found.

Armco research engineers set out to find it. They spent much time on the job . . . and at last succeeded. This new process is called "electro-polishing." Small articles of Stainless Steel are suspended in an electrically-charged chemical bath, and the surface of the steel is quickly polished. It imparts a lasting lustre.

If your products are suited to Stainless Steels, just get in touch with us. For many years Armco has been the leader in developing special-purpose sheet steels and today is one of the world's great producers of Stainless Steel sheets, strip bars and wire.

Leading manufacturers choose the steel that bears the famous Armco triangle trademark. It speeds production . . . puts high quality and long life into the products they make. The American Rolling Mill Co., 4301 Curtis St., Middletown, O.

more scrap means more steel

We urge you to collect every pound of iron and steel scrap, including unused and obsolete equipment. Speed it to the steel industry through your regular channels. Present high production cannot be maintained unless more scrap is shipped to the mills promptly. The situation is critical. Act now.

STAINLESS ARMCO STEEL

The American Rolling Mill Company

Special-Purpose Sheet Steels • Stainless Steel Sheets, Strip Bars and Wire

technical information with European chemical companies. **George T. Collins** has been appointed manager of the market research department, Pennsalt. Mr. Collins, formerly a chemical engineer in the department, was assistant manager of market research.

—o—

Lawson Adams has been elected secretary and member of the board of directors, Wrought Washer Mfg. Co., Milwaukee. He has been with the company 5 years. **Walter F. Borges** has been appointed sales manager of the company, succeeding the late **William F. Disch**. Mr. Borges will also be in charge of advertising.

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Edmund D. Kennedy has been appointed sales promotion manager, Plastics Division, Springfield, Mass., Monsanto Chemical Co., St. Louis. He will have general supervision over sales promotion activities of the division, and will report to **F. A. Abbiati** and **James R. Turnbull**, general sales manager and assistant sales manager, respectively. For the last 2 years, Mr. Kennedy was sales promotion manager, Vickers Inc., Detroit, subsidiary of Sperry Corp., New York. **Dr. C. K. Bump** and **H. W. Mohrman** have been appointed assistant directors of research of Monsanto's Plastics Division. Dr. Bump will be in charge of general application and technical service sections, while Mr. Mohrman will head the physics and physical testing sections. Both men were formerly research group leaders. Dr. Bump joined the Springfield plant as a research chemist in 1937. Mr. Mohrman joined Monsanto in 1939. **Harold F. Park** has been appointed senior chemist for the Plastics Division.

—o—

H. E. Slocum, director of chemical laboratories for Jones & Laughlin Steel Corp., Pittsburgh, has retired after 49 years' service with the corporation. He joined Jones & Laughlin in 1897, as a chemist at the Pittsburgh works. In 1914, he was appointed chief chemist at that works, and in 1936, he was named director of chemical laboratories for the corporation. Mr. Slocum has been a member of the Pittsburgh section of American Chemical Society for the last 32 years, and for a number of years was counselor for that section.

—o—

Warren S. Lockwood, foreign trade consultant, has been appointed vice president in charge of overseas activities, World Trade Foundation of America Inc. Mr. Lockwood has left for London to furnish the foundation with first hand reports of the Oct. 15 London World Trade Conference. Upon his return he plans to assist the foundation to interpret to American industry the hope for expanding two-way world trade emanating from the conference and the reciprocal trade agreements planned for 1947. Mr. Lockwood is also chairman of the newly formed industrial trade associations committee of the foundation.

—o—

Fayette Leister has been elected vice president in charge of engineering, Fafnir Bearing Co., New Britain, Conn. He joined the company in 1921, as a sales engineer. During the decade of 1935-1945, he was in charge of the Fafnir branch in Detroit. Early in 1945, he was appointed engineering manager, with his office in New Britain.

—o—

Herbert Hahn has been promoted to vice president, A. F. Anderson Iron Works, Chicago. **Al J. Conn** has been appointed vice president, and **Harry Silberman**, treasurer.

—o—

P. E. Beaver has been appointed manager of the new Cleveland office, Landis Tool Co., Waynesboro, Pa. Mr. Beaver represented the company in England before the war, and has since been with the Chicago office.

—o—

Robert Potter has been appointed manager, Rolling Mill Division at Salem, O., of E. W. Bliss Co. Mr. Potter, who joined the Bliss organization last January, had been chief engineer of the Rolling Mill Division. Prior to that, he was chief engineer, Superior Steel Corp., Carnegie, Pa.

—o—

H. R. McLaren has been named assistant general superintendent, Timken Roller Bearing Co., Canton, O. **J. P. Wargo** has been appointed superintendent of tube mills for the company, and **R. R. Elsasser**, assistant superintendent of tube mills. Mr. McLaren joined the company in 1930, as piercing mill superintendent for the Timken Steel & Tube Division. He has been superintendent of tube mills since 1937. Mr. Wargo, who had recently been assistant superintendent of tube mills and finishing departments, joined Timken in 1936 as an inspection engineer. During the war, he was superintendent of Timken Ordnance Co. Mr. Elsasser, who joined the company in 1935 as a sales trainee and member of the steel sales force, went to the steel inspection engineering department in 1942. In 1943, he was transferred to the Gambrinus metallurgical department. Since 1944, he had been manager of the company's war-born Newton Falls, O., plant.

ROBERT POTTER

—o—

P. L. Coddington has been appointed manager of sales, Welded Alloy Tube Division, Carpenter Steel Co., Kenilworth, N. J. **J. A. Dietrich** has been named assistant manager of the division.

—o—

Joseph H. Hyde, superintendent of Bristol Brass Corp., Bristol, Conn., has been appointed Bristol community chairman, Committee for Economic Development.

—o—

E. U. Lassen, assistant chief engineer, Cutler-Hammer Inc., Milwaukee, has been appointed chairman of the committee on industrial control devices, American Institute of Electrical Engineers, for the second successive year.

—o—

L. G. Schraub, vice president and general manager, has been elected to the board of directors of Union Wire Rope Corp., Kansas City, Mo.

—o—

Walter H. Dupka, controller and assistant secretary, Jones & Laughlin Steel Corp., Pittsburgh, has been chosen director, Controllers Institute of America.

—o—

C. F. Spindler has been appointed general manager, Kurz & Root Co., Appleton, Wis. He was secretary and treasurer, Central Paper Co. Inc., Muskegon, Mich.

—o—

Herbert C. Graves has been appointed chief engineer, Gibson Electric Co. Pittsburgh. He had been engineering manager for I-T-E Circuit Breaker Co., Philadelphia.

—o—

Edward R. Yonkers has been appointed Wolverine district manager, Graybar Electric Co., New York. He will make his office in Detroit, and will head Graybar activity in the Flint and Lansing, Mich., areas as well as Detroit. Mr. Yonkers joined the company in 1933, as a salesman. Last June, he became assistant manager at Detroit, serving under **A. R. Maynard**, retiring Wolverine dis-

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trict manager. Mr. Maynard has been with Graybar over 40 years, and will remain in an advisory capacity until Nov. 1.

—o—

James G. Mowry has retired as industrial paint salesman, Paint Division, Pittsburgh Plate Glass Co., Pittsburgh. He had been with the division 45 years, and had headquarters in New York since 1904. With the retirement of Mr. Mowry, the sales of railway industrial finishes in the eastern territory will be handled out of company offices in New York, Baltimore and Pittsburgh. **Glenn N. Stanford** will handle the sales from Baltimore, **John Leonard**, long an associate of Mr. Mowry in the New York office, will handle sales from New York, and **Jack A. Burke** will handle the Pittsburgh territory.

—o—

D. E. Inman has been appointed engineering manager, district engineering and service department, Westinghouse Electric Corp., Pittsburgh. Mr. Inman will be located at the East Pittsburgh, Pa., plant, and will be responsible for co-ordination of consulting and application engineering and product performance analysis activities of the department. Mr. Inman joined Westinghouse in 1925. **A. W. Larson** has been appointed manager of lighting and distribution apparatus of the Westinghouse agency and specialty sales department. Mr. Larson, who had been a lighting engineer for the company's northwestern district in Chicago, will make his headquarters in East Pittsburgh. He joined Westinghouse in 1937.

—o—

Adm. Ben Moreell will resign as National Coal Administrator when he retires from the Navy on Sept. 30. He will be succeeded by **Capt. Norman H. Collison**, now deputy administrator. Admiral Moreell will become president of Turner Construction Co., New York, effective Oct. 1, succeeding **J. Archer Turner**, who is becoming chairman of the company's board of directors. The present chairman, **Henry C. Turner**, is retiring.

—o—

Abijah U. Fox has been elected chairman of the board of directors, Mathieson Alkali Works, New York. Mr. Fox recently returned from Europe, where he served as deputy director, Finance Division, U. S. Military Government, Germany. Prior to his war job, he was with the Treasury Department, which he joined in 1941. He served as deputy director, Foreign Funds Control, and director of the Office of Surplus Property.

—o—

George G. Knecht has been appointed manager of the new Stratford, Conn., office, Hanson-Van Winkle-Munning Co., Matawan, N. J. Mr. Knecht had served the company in the Connecticut territory for many years. **Walter J. Jurman** has been transferred from the Chicago office to take charge of the company's new warehouse in Stratford. **Robert M. Norton**, who has represented the H-VW-M company in New York state, with headquarters in Skaneateles, N. Y., has been promoted to the post of district manager of the company, and will be responsible for all field operations in the state, with the exception of New York city and its suburbs. **Glenn M. Herring**, recently released from the Army, has returned to the Pittsburgh office of the company. He served in the Pittsburgh office from 1930 to 1942. **B. F. Parlett Jr.**, who represented the firm during the absence of Mr. Herring, will continue to be a member of the Pittsburgh staff. **Walter R. Lockwood** has been placed in charge of the new Anderson, Ind., office of Hanson-Van Winkle-Munning. He had been in the Elkhart, Ind., office, which is closing.

—o—

E. J. Lapointe is president of the recently organized Acme Broach Corp., Lexington, Ky. **Francis J. Lapointe** has been appointed executive vice president of the firm. He has been actively engaged in broaching work for the last 44 years, and will devote his full time to research and development for the corporation. **I. K. McAdam** will head the design department of Acme Broach Co. He was previously with American Broach & Machine Co., Ann Arbor, Mich.

—o—

D. H. Ruhnke has been appointed chief metallurgical engineer, Central Alloy District, Republic Steel Corp., Cleveland, succeeding **E. R. Johnson**, newly appointed assistant district manager. Mr. Ruhnke had been assistant chief metallurgical engineer. He will be succeeded in this capacity by **V. W. Whitmer**. Mr. Ruhnke joined Republic Steel in 1933. Mr. Whitmer joined the corporation in 1923 and specialized in stainless steel metallurgy, being named head of that department in 1939. Prior to joining Republic Steel, Mr. Ruhnke had been with Bethlehem Steel Co., Bethlehem, Pa.

FRANCIS J. LAPOINTE

—o—

V. E. Cribbs has been appointed assistant to director of personal relations, American Rolling Mill Co., Middletown, **O. Ralph J. Wright** has been appointed assistant to manager of the company's Middletown Division. Mr. Cribbs joined the company in 1920. He became supervisor of personal relations at the company's east works in 1928, and since 1932 had been assistant to the works manager of the Middletown Division. Mr. Wright joined the company in 1917. In 1927, he was appointed assistant supervisor, personal records department. The same year he became chief interviewer in the Armco employment department. He had been assistant supervisor of personal relations since 1944.

—o—

Johns-Manville Corp., New York, has been reorganized into six operating divisions. The following have been appointed general managers for the divisions: Industrial Products, **J. A. O'Brien**; Building Products, **Harold R. Berlin**; Celite, **A. S. Elsenbast**; Canadian, **E. C. Brockett**. **E. S. Crosby** continues as general manager of the International Division, while **A. R. Fisher**, vice president for production, will act as general manager of the Asbestos Fiber Division.

—o—

James S. Knowlson, chairman of the board and president, Stewart-Warner Corp., Chicago, has been presented the Medal for Merit, highest award of the armed services to civilians. The award was made by **Robert P. Patterson**, secretary of war. Mr. Knowlson served in various government capacities during the war. His service, which began Oct. 1, 1941, as deputy director of priorities, Office of Production Management, included director of Division of Industry Operations, War Production Board, Jan., 1942; vice chairman, combined Production Boards, Sept., 1942; and central field commissioner, European Theatre of Operations, Army-Navy Liquidation Commission, May-Sept., 1945. Mr. Knowlson is at present a member of the Business Advisory Council, Department of Commerce.

—o—

J. E. Fifield has joined the Development & Research Division, International Nickel Co. Inc., New York. He will make his headquarters at the New England technical section of the division, at Hart-

CARL I. SCHWEIZER
Appointed chief metallurgist. Steel Improvement & Forge Co., Cleveland, noted in STEEL, Sept. 16 issue, p. 93.

HAROLD N. EWERTZ
Appointed sales manager, Electrode Division, McKay Co., York, Pa., noted in STEEL, Sept. 23 issue, p. 98.

CLEVE H. POMEROY
Who has been appointed president, National Malleable & Steel Castings Co., Cleveland, noted in STEEL, Sept. 23 issue, p. 103.

ford, Conn. Mr. Fifield served in the Navy during the war. From Nov., 1944, until last May, he served as assistant to plant manager and foundry metallurgist, U. S. Naval Research Laboratory, Washington.

—o—

H. W. Foulds, president, Permutit Co., New York, has become president of Simplex Valve & Meter Co., Philadelphia, recently acquired subsidiary of the Permutit company. Mr. Foulds succeeds **W. H. Roth,** who becomes Simplex board chairman.

—o—

Martin Toscan Bennett, consulting engineer, has opened an office in Washington, for the practice of general industrial engineering with special facilities for foreign developments. Mr. Bennett has just returned from abroad, where he was chief of staff of **Ambassador Edwin W. Pauley's** mission which surveyed industries in Japan, Korea, Manchuria, Germany and Austria. He served throughout the war as economic and technical consultant to several war agencies, including War Production Board, Office of Economic Warfare, and Foreign Economic Administration.

—o—

C. Edward Price has been elected president, Peninsular Grinding Wheel Co., Detroit. He joined Peninsular 11 years ago as sales manager, and was later named vice president in charge of sales.

—o—

Macy O. Teetor has resigned as vice president in charge of engineering, Perfect Circle Co., Hagerstown, Ind., after 23 years of active engagement in company management. He will continue as a member of the board of directors and an engineering consultant. **Daniel C. Teetor** has been appointed acting vice president in charge of engineering for the company, in addition to his present position as vice president in charge of manufacturing.

—o—

George P. Eichelsbach Jr. has been promoted to director of manufacturing and engineering, American Stove Co., Cleveland. He joined the company in 1935, as an engineering draftsman in the St. Louis plant, and became successively chief engineer of the St. Louis Division, and chief engineer of the company.

OBITUARIES...

Laurence S. Andrich, vice president and general manager, Snyder Tool & Engineering Co., Detroit, died in that city recently. He joined Snyder as a draftsman in 1928. For a number of years, he was vice president in charge of sales and engineering. He had held the position of vice president and general manager for the last year. Mr. Andrich was a member of American Society of Tool Engineers.

—o—

John A. Sizer Sr., 66, vice president and general sales manager, Industrial Gear Mfg. Co., Chicago, died in Seattle, Sept. 17. He had been associated with the foundry and gear business in Chicago 45 years.

—o—

Frederick Snare, 83, chairman of the board and former president, Frederick Snare Corp., New York, died in the American Hospital, Havana, Cuba, Sept. 22. As a young man, he worked with, and later become vice president of, Pencoyd Iron Works, Philadelphia, which later was absorbed by American Bridge Co., Pittsburgh. He organized his own firm in 1900, and was president of it until 1927, when he became board chairman.

—o—

George Feucht, 66, a retired constructural draftsman and designing engineer for Jones & Laughlin Steel Corp., Pittsburgh, died recently at his home in that city. He had been with the firm 38 years.

—o—

William J. Pulte, 48, a sales executive for Wisconsin Screw Co., Racine, Wis., died of a heart attack while driving his automobile, Sept. 20.

—o—

M. C. Russell, 63, retired Delaware, O., industrialist, died recently in that city. In 1907, Mr. Russell, with **S. S. Blair** and **O. D. Hunt,** established Sunray Stove Co., Delaware, O., Mr. Russell acting as general manager. In 1930, at the death of Mr. Blair, Mr. Russell became president of the company. He held that position until his retirement in 1936. Mr. Russell was one of the organizers of Delo Screw Products Co., Delaware, in 1939, and at the time of his death was vice president of that company.

—o—

John A. Williams, 54, president, Geometric Stamping Co., Cleveland, died recently in that city. He had once served as production manager for Truscon Steel Co., Cleveland, subsidiary of Republic Steel Corp. At the start of the war, he was named production manager of the Nashville, Tenn., plant, Consolidated Vultee Aircraft Corp., San Diego, Calif. He later worked in the same capacity for American Central Mfg. Corp., Connersville, Ind.

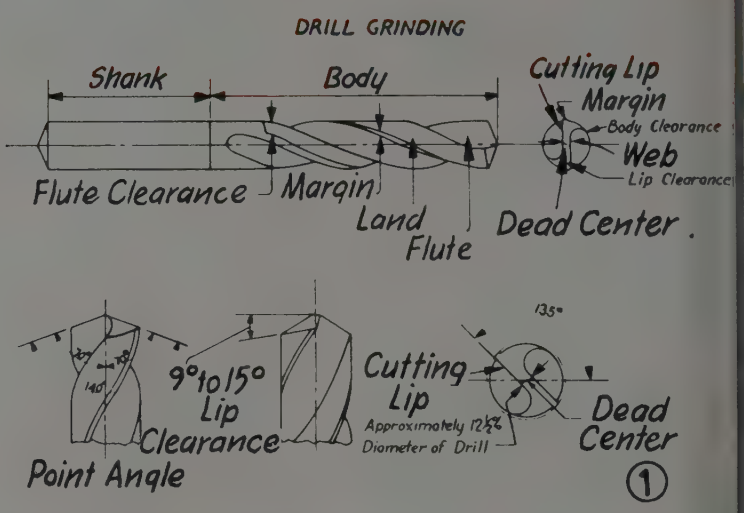
—o—

Herman E. Krulewitch, 58, secretary, Simon Krulewitch Inc., Chicago, died Sept. 17 in that city.

Machining Stainless

Although often considered difficult, machining of stainless steels becomes much less troublesome when approved procedures are followed. This and two subsequent articles provide a guide to faultless practice and lower costs

By E. VON HAMBACH
Research and Development Engineer
Carpenter Steel Co.
Reading, Pa.



MAXIMUM production in machining stainless steels is not achieved through use of a single set of rules or a simple formula that will prove the best for machining jobs. The operator will have certain specifications for the work he is turning out. It is these requirements, together with the equipment he is using, that must determine the speeds, feeds, lubricants, etc., that will do the job best.

First step then is to determine all the factors of the job. Next, follow those recommendations made here that best fit the requirements of the task. An operator knowing all factors should be able to get very satisfactory results with any type of stainless steel.

Production speed is not only how fast the machine is running—or how many parts can be machined within a given period—*but how quickly the entire run can be completed*. The faster the cutting speed the more quickly the tools will wear and the more frequently the machine will have to be shut down for re-grinding of tools. Idle machine time is lost production time. Slower speeds with longer tool life is often the answer to higher ouput and lower costs.

Drilling: This is one of the most common and yet most important jobs of machining, as later operations are frequently located from the first drilled hole. Accuracy, therefore, is vital. Like all machining operations, drilling is also a housekeeping problem. Whether a drill chuck or spindle with tapered hole is used, the chuck must be kept clean and free of chips. Chips must be kept away from the work, because they can act as an abrasive and dull the drill.

In any drilling operation, the following factors are important:

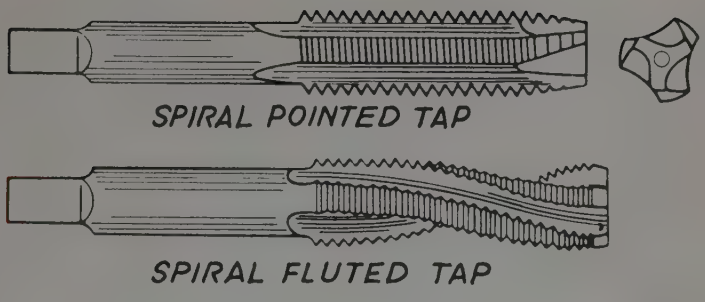
Work must be kept clean.
Drills must be carefully selected and correctly ground.
Tools must be properly aligned and work firmly supported.
Stream of lubricant must be properly directed.
The depth of hole to be drilled controls the number of bites required.

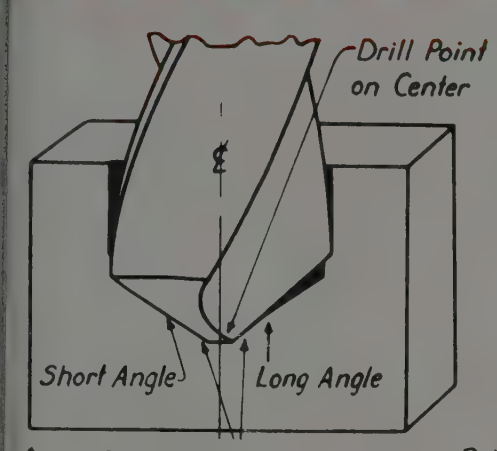
When not using jigs, marking the piece is the first step in getting the drill off to a quick start. When working with stainless, particularly the 18-8 types, it is advisable to use a sharp three-cornered punch rather than a prick punch, to avoid work-hardening the material at the mark. It is also very important that the work and tools are properly aligned—and that work is rigidly supported.

To relieve chip packing and congestion, drills must occasionally be "backed out." Roughly, the rule for successfully drilling stainless is to take three to four times the diameter of the drill on the first bite, one or two diameters on the second bite, and three-quarters to one diameter on the third bite.

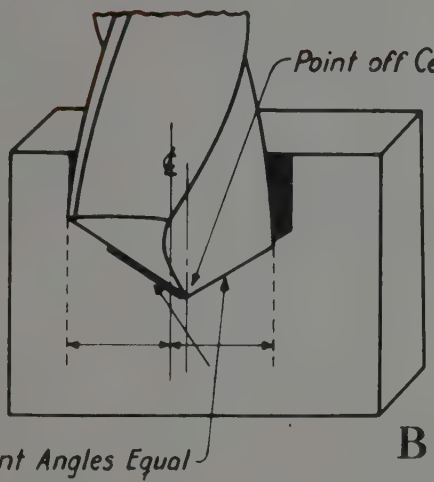
When drill size permits, a groove should be ground

Steels





A Point Angles Unequal



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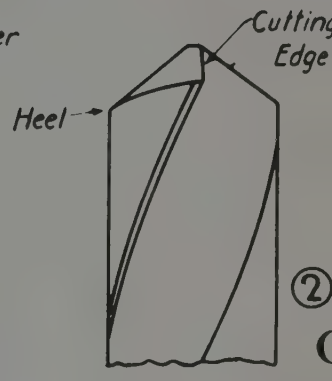


Drill Ground with Proper Clearance. Note Heel is Lower Than Cutting Edge.

parallel to the cutting edge in the flute for chip clearance. Deeper holes can be drilled on each bite and tool life can be increased. If the hole "runs out," a good way to maintain concentricity is to drive both work and drill.

Rates of feed are given in Table I, the column entitled "Approximate Feed" covers drills ranging from ¼-in. to ½-in. diameter. On smaller diameters, the feed should not be as high. For example, ⅛-in. to ¼-in. diameter, feed would be 0.002-in. to 0.004-in. On sizes over ½-in. and up to and including 1-in., the feed would be 0.007-in. to 0.015-in.

On small drills, breakage will be excessive if drills are not run fast enough. Bear in mind a 1/16-inch diameter drill cutting at 40 surface ft per min should turn at a spindle speed of 2445 rpm.

Do not let drill dwell during cutting, particularly on the chrome-nickel types such as Type 302, Type 303, etc. Allowing the drill to dwell or ride, glazes these work-hardening grades and it then becomes very difficult to get under this glazed or work-hardened surface.

For general purpose drilling, twist drill makers produce a stainless steel drill. It has a shorter flute and overall length than regular drills and is therefore heavier and stronger. As sold from stock, this type of drill is generally pointed with an included angle of 140°. Use a cotter pin drill when necessary to drill small cross holes in the heads of bolts, screws, pins, etc. It is a more heavily constructed drill which stands abnormal strains and the shorter helix angle of the flutes aids chip removal.

Generally it is recommended that drills be chucked for shortest drilling length. Long drills tend to whip and flex and may easily break, or cause inaccurate work. Some jobs require exceptionally deep drilled holes (where the depth of the hole is eight to ten times the diameter). Therefore, short chucking is impossible. In such cases, very often special drills known as "crankshaft hole drills" are well worth trying because of their short spirals. These drills were originally designed to drill oil holes in forged crankshafts and connecting rods, but have found wide spread use in drilling deep holes. They are made with a very heavy web and a higher spiral or helix angle than regular general purpose drills. They usually come with a notched point type of web thinning which is done on a sharp-cornered hard grinding wheel. Commercial attachments set to grind this notched type of point are available. As purchased, these drills usually have the points ground to 136° included angle, with a heel clearance of 9°. For a particular job it may be desirable to increase this to approximately 140° included angle and 12° heel clearance —depending upon the grade and hardness of the stainless being drilled.

It is especially important to grind drills correctly. First, the lip clearance should be between 9° and 15°. Second, the two cutting edges must be of equal length and angle.

Machining Stainless Steels

The sketches in Fig. 1 show a properly ground drill which will cut true-size holes with a maximum drill life between grinds.

The use of grinding fixtures is strongly recommended for regrinding drills. No "free-hand" grinding of drill points can be close enough to insure getting the correct clearance, included angle and center location. A good grinding fixture not only means longer life between grinds but cleaner and more accurate holes.

Best results in grinding high speed drills are obtained by using medium grain, soft grade dry wheels. Blueing or burning should be avoided. Quenching will often check or crack the drill. If burning does occur, the drills should not be quenched.

Tapping: Before tapping operations can be started, a hole must be drilled. There has been a tendency on the part of some machinists to overlook the important part that the hole bears in relation to securing a finished tap hole of the desired quality—particularly in production operations. Do not forget that the tap is simply a cutting tool and is not a corrective for a small or poorly drilled hole. Taps require the same consideration and care as any other sharp edged tool. Good screw threads can not be obtained unless the job is carefully considered and the right tap just as carefully selected. "Any old tap" won't do.

Basically, there are two types of holes prepared for tapping—(1) the open or through hole; (2) the blind hole.

(1) For open or through holes, many have used with success, either the spiral fluted or the straight flute spiral-pointed tap. They are particularly desirable when tapping the softer and nonfree-machining alloys because they provide more adequate chip relief. The spiral-pointed tap should not be used in blind or closed holes unless there is sufficient untapped depth to accommodate the chips. This type of tap cuts with a shearing motion. It has the least amount of resistance to the thrust, and the entering angle deflects the chips so that they curl out ahead of the tap. This prevents packing in the flutes, a frequent cause of tap breakage. When backing out a spiral-pointed tap there is less danger of roughing the threads in the tapped part.

(2) To obtain best results in tapping blind holes, special spiral-pointed bottoming taps are available. The three or four fluted tap also is satisfactory. Many screw machine operators obtain good results with the two and three flute taps on sizes up to ½-in.

When laying out a tapping job the percentage of thread depth must be determined and this should be governed by the diameter and pitch of tap, plus depth of tapped hole, plus toughness or hardness of material. There is a definite limit to the strength of a tap and the amount of metal it will cut or move. Therefore, on the tough and harder materials tap life is increased when a lower percentage of thread depth is cut. Under such conditions it will be found economical to tape twice—first, roughing out the hole with an undersized tap, and then finishing to size with a second tap.

Customary manufacturing practice usually provides for depth of thread not less than 62 per cent and not more than 75 per cent. A 100 per cent thread depth is only 5 per cent stronger than a 75 per cent thread, but requires three times as much power to tap. A bolt on a 50 per cent thread will break before the thread will strip.

A general rule in laying out a new job is to use a 100 per cent thread where the thickness of metal is one-half or less than the diameter of tap. Use a 75 per cent thread where thread depth is up to two times the tap diameter. On jobs where thread depth exceeds twice the diameter of tap, it is economical to use only 50 per cent thread. This greatly increases tap life and cuts power required.

Tap drill sizes are often selected from old "standard" tables which serve their purpose well for many run-of-mine jobs. However, for tapping stainless, particularly where fine pitches are required, it has been found that some of the drill errors are too great—therefore the following formulae are given. Users of these formulae have found it is sometimes an advantage to divert from standard decimal drill sizes to millimeter sizes—and in extreme cases to have special drills made. Even a special drill, as a general rule, costs much less than a tap. As an example, take the common No. 8-32 size, where as close to a 75 per cent thread as possible is required. The No. 29 (0.1360-in.) drill gives only a 69 per cent thread depth, which is not enough. The No. 30 (0.1285-in.) drill (next size) gives an 87 per cent thread depth, which is too much. By

TABLE I DRILLING SPEEDS AND FEEDS

Type No.	Surface Feet per Minute (Low and High)*	Approximate Feed (on drills ¼-½-in. dia.)	Nearest Comparable Equivalent in Ordinary Steels
410	35/75	0.003/0.007-in.	SAE-3140, 4140, 6140, etc.
420	30/60	0.003/0.007-in.	SAE-1095, 3150, 3312, 6150
420F	70/90	0.003/0.007-in.	SAE-2315, 2340, 2345
440	20/40	0.003/0.007-in.	High Speed Tool Steel
440F	50/70	0.003/0.007-in.	SAE-1060, 1070, 1095
443	35/75	0.003/0.007-in.	SAE-3145, 3250, 4650, 6150, etc.
302	15/40	0.003/0.007-in. (Use constant feed)	Copper-nickel alloys—except that 302 work-hardens
416	70/110	0.003/0.007-in.	SAE-1030, 1120, X1340
430	35/75	0.003/0.007-in.	SAE-3140, 4140, 6140, etc.
430F	70/115	0.003/0.007-in.	SAE-1030, 1120, X1340
329	20/40	0.003/0.007-in. (Use constant feed)	Copper-nickel alloys
303	35/85	0.003/0.007-in. (Use constant feed)	SAE-3120, 3145, 4615

NOTE: The above speeds and feeds are average. For some jobs the higher speeds may be used and on other jobs—depending on the type of work—it may be more economical to use speeds on the lower side.

* The above speeds are based on the use of high speed drills. When using carbon drills, reduce speeds by 40% or 50%.

TABLE III TAPPING SPEEDS

Type No.	Surface Feet per Minute (Low and High)	Nearest Comparable Equivalent Ordinary Steels
410	10/25	SAE-3140, 4140, 6140, etc.
420	10/20	SAE-1095, 3150, 3312, 6150
420F	15/25	SAE-2315, 2340, 2345
440	5/15	High Speed Tool Steel
440F	10/20	SAE-1060, 1070, 1095
443	15/25	SAE-3145, 3250, 4650, 6150, etc
302	10/20	Copper-nickel alloys—except that 302 work-hardens
416	15/35	SAE-1030, 1120, X1340
430	10/20	SAE-3140, 4140, 6140, etc.
430F	15/40	SAE-1030, 1120, X1340
329	5/15	Copper-nickel alloys
303	15/30	SAE-3120, 3145, 4615

NOTE: The figures shown above are average. On some jobs it may be possible to use even higher speeds. However, on certain work, the nature of the part to be tapped may require slower speeds than are recommended here. All recommendations are based on the use of standard high speed tools.

Stainless

using a 3.40 mm (0.1339-in.) drill you will get a 74 per cent thread depth. It is advisable, therefore, to check each job according to these formulae:

No. 1—*for obtaining tap drill size:*

$$\text{Outside Diameter} - \frac{0.0130 \times \%\ \text{Full Thread}}{\text{Number of threads per in.}} = \text{Drill Size}$$

Example: for ¼-in. × 20 thread:

$$0.250 - \frac{0.0130 \text{ in.} \times 75}{20} = .2013 \text{ or number 7 drill}$$

No. 2—*for obtaining percentage of thread a given drill will produce:*

$$\frac{(\text{Outside dia.} - \text{drill size}) \times \text{number threads per inch}}{0.0130} = \%\ \text{of full thread}$$

Example: for ¼-in. × 20 thread:

$$\frac{(0.250 - 0.201) \times 20}{0.0130} = 75.4\%\ \text{thread}$$

Type of tap selected will depend largely on the "Class of Fit" required. The following four classes are standard:

Class 1—Loose Fit
Class 2—Free Fit
Class 3—Medium Fit
Class 4—Close Fit

Class of fit also determines whether it is necessary to use cut thread tap, ground thread tap or a precision ground

REGRINDING TAPS

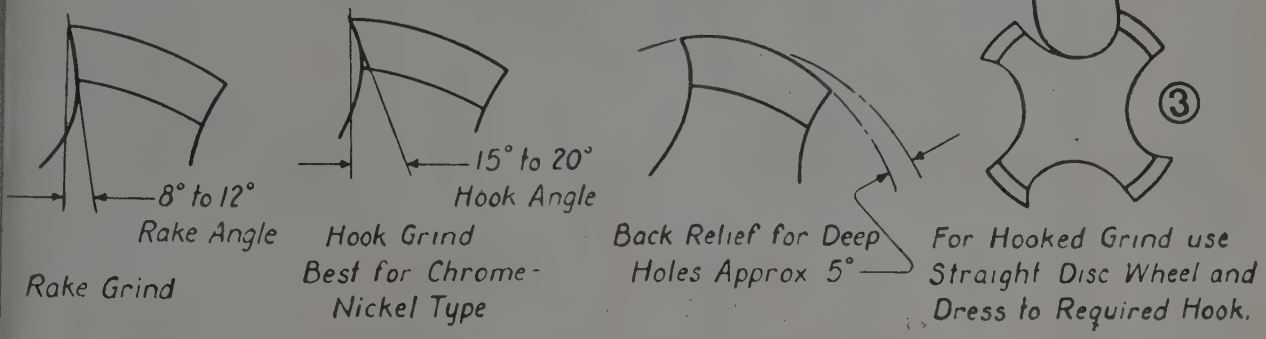


TABLE II DRILLING CHECK CHART

Free-hand and poor grinding cause 90% of all drill troubles. Good grinding fixtures, wheels and careful grinding are important

TROUBLE	CORRECTION
Broken drills.	Chuck drills as short as possible to stop flexing or weaving. Dull drills break. Not enough lip clearance. Check speed of drill. Too slow or too fast will break them. Check clamp and drill fixture for rigidity and tightness.
Splitting up the center.	Drills without sufficient lip clearance do not have enough cutting edge—so feed pressure builds up and splits drill up the center. If lip clearance is correct, reduce the feed.
Drilling requires abnormal feed pressure.	The center web increases in thickness toward the shank. This strengthens drills. As drills become shorter from use or repeated regrinding, the web becomes wider and must be thinned. By point-thinning back to ⅛ (or 12½%) of drill diameter, this trouble is eliminated. Point-thinning must be done equally on both sides of the web or web will be off center and drill oversized holes. Don't thin back too far as this weakens the point. See Fig. 1.
Drills breaking on "through" holes.	Check drill press and fixtures for rigidity. "Backlash" or "spring" in press or work usually the cause. Job may require backing plate.
Weak drill point.	Drills are designed to have a web thickness of 12½% (⅛) of their diameter. Less than this weakens the point. Regrinding corrects this trouble.
Poor cutting results on certain materials.	For stainless steel, the recommended point is 140° included angle. Therefore, first check point angle. The hardness or softness of material determines angle. As an example, drill manufacturers recommend a 150° point included angle for high manganese steels and a 118° included angle for SAE-1020.
Drill wears undersize quickly.	Check volume of lubricant. Is lubricant flooding drill? This condition is either poor lubrication or lubricant is too rich in sulphurized base oil and should be cut back with suitable blending oil. Undersized drill jig bushing will wear drill.
Poor cutting with a sharp drill.	Not enough clearance back of the cutting edge. See Fig. 2 (c).
Chipping of "margin."	Check drill jig bushing for size; usually an oversized drill jig bushing causes chipping.
Breakage of drill tang.	Generally this trouble comes from worn chuck, or nicks on tang, as well as burrs or dirt. Check these items and be sure shank fits into sleeve or taper snugly. Sleeves may be in poor condition.

TROUBLE	CORRECTION
Drill "digs in."	Check bearings and spindles of drill press. Sloppy fits are generators of this trouble. This trouble prevails mostly on small drills, so if press is all right, try grinding a secondary angle of 7° to 9°, which will back up the cutting edge and stop hogging or "digging in."
Rough surface in finished hole.	Several factors lead to this condition, any one of which can be the cause. Generally it is due to too fast a feed. Try a higher speed and slower feed. If this does not correct the trouble, check the drill for proper grinding. Check lubricant for volume. Be sure enough reaches the drill. Poor chip elimination may be the cause. Check entire set-up, including machine.
Drill breakage on outer corners of cutting edges.	Assuming that lubrication is of correct mixture and in sufficient volume, this is then caused by too high a speed. Reduce speed until trouble disappears.
Drill chipping or breaking down on cutting edges or lips.	This can be an indication of too much lip clearance for that particular job. Therefore, check this first. The only other cause comes from too much feed pressure, in which case reduce pressure until trouble is eliminated.
Change in chip formation while drilling.	If job has been running satisfactorily, that is an indication the condition of drill has changed. Look for dull or chipped drill.
One lip carrying most of cutting load	Regrind drill to correct the unequal angles of the cutting lips. Both cutting edges must have identically the same angle with center line of drill. The recommended 140° included angle may vary slightly one degree under or over but the variation must be alike on both cutting edges. See Fig. 2 (a).
Hole drills oversize.	Check machine spindle for excess wear, and jig bushing for sloppy fit. If these are O.K., the trouble lies in the drill. Check lip length of drill. Oversize holes are caused if the lips are not equal in length. This condition throws the point off center. Watch the drill and it will operate like a wheel with the hub off center. This also causes press strains and noticeable spindle wobble. See Fig. 2 (b).
Drill Squeak Drill Groaning.	Friction causes squeaking, usually due to the hole being crooked; drill dull and not cutting; or insufficient lubrication. Overloading causes groaning, usually due to overfeeding; poor chip clearance, allowing chips to get under cutting edge. Also land on the flutes toward the cutting edge may be worn and tapered.

Crankshaft
Cotter Pin

thread tap, with either No. 01, No. 1 or No. 2 tolerance. A cut thread tap is used for Class 1 fits. Ground thread taps are used for Class 2 fits, and the precision ground taps are used for Class 3 and Class 4 fits.

Since tap manufacturers are now making taps which have the threads ground concentric with the shank so that they run true, there is less reason to use a floating holder. A floating tap does not produce consistently accurate or concentric threads—because when pressure is applied to

Machining Stainless Steels

the tap the wobble lets it take hold at a different angle each time. This promotes undue strain because of the angle it is working in. It also is cause of oversize holes—and when the tap is reversed it will most likely cut while backing out. This dulls the tap quickly, for like all cutting tools, it dulls rapidly when running backward. A badly worn and sloppy tapping machine is usually the only reason for using a floating holder. Modern-day tappers have accuracy and rigidity built into them.

Chip removal is important for close tolerance tapping. Without a place for the chip to go, no hole could be tapped. When the wrong tap is selected, chips crowd into the flutes, therefore flutes should not be too shallow or the lands too wide. Often the power required to break packed chips is more than that required to cut the thread. And when this happens, the tap, being weaker and working against the power of the machine, will break. Chip packing also causes taps to cut oversize threads. Chips from tapping can be controlled accurately the same as on any other cutting tool.

When a job is tapped from punched holes, the hole must be uniform and of the right size or the tap may load and break. Check the punches and be sure that the hole is not undersize because of punch wear. Forged holes can also cause trouble unless they are properly sized prior to tapping. This pays off in longer tap life and fewer regrinds.

Performance of taps in stainless steel is very greatly influenced by the rake angle of the cutting face. Sketches shown in Fig. 3 are average recommendations, for some types of tapping it may be necessary to alter the cutting face design or angle. Occasionally, due to a combination of variables on certain types of work, the hook grind, which normally is best, will not give satisfactory results. In such cases, an interrupted thread tap with an uneven number of flutes has licked the problem since it requires 40 to 50 per cent less power than regular taps (particularly where the tapping machine lacks power). The problem of roughness on the back face of the thread can sometimes be overcome by using a negative grind on the heel of the tap. This prevents taps from tearing the threads when backing out.

Similar to drilling, it is very poor practice to regrind taps free-hand, particularly the chamfer; Fig. 4 clearly indicates why this is so. Correct resharpening and grinding of taps keeps production costs down. Dull or improperly ground taps should not be used because they not only produce rough and poor threads or cut oversize, but may chip.

Generally, sharpening means only regrinding the chamfered portion or point of the tap. While in many cases this is done by hand, it is not recommended, as an uneven grind often results, causing all the teeth on one or two lands to carry the full load. This places an excessive strain on the tap, requiring greater power for operation and contributes to tap breakage. Another evil of unevenly ground taps is their tendency to cut oversize. So, if regular tap grinding machines are not available, fixtures should be made to reproduce the original chamfer accurately.

Lubrication is frequently not given enough thought in tapping operations. While the sulphur base oils have proved most successful, specific compositions or ratios of sulphur base oils to paraffin base oils are a definite requirement on certain jobs. After the best mixture has been determined, it is equally important that the flow of the lubricant to the taps and the work be given consideration. It is often desirable to use two streams of lubricant—one on each side of the tap. Start the flow before the tap starts to cut and do not shut it off until after the cut is finished. This also applies to machines where provisions are made to automatically shut off the flow during tap reversal.

Reaming: It will be noted that Table V gives a wide range in the recommended cutting speed. This is due to a combination of variables that exist on this type of work, governed entirely by tolerances and the quality of work desired.

On nonfree-machining chrome-nickel (18-8) grades, ample material must be left to permit operator to take a definite cut. This is a protection against dragging or riding, which produces rapid wear and failure of the reamer. Allowing the reamer to take a definite cut also avoids burnishing, which results in undersize holes and rapid reamer wear. Better results are secured if reamers are mounted in floating holders. Narrow lands and stoned cutting edges are recommended. Stoning the edges of reamers is of particular impor- (*Please turn to Page* 119)

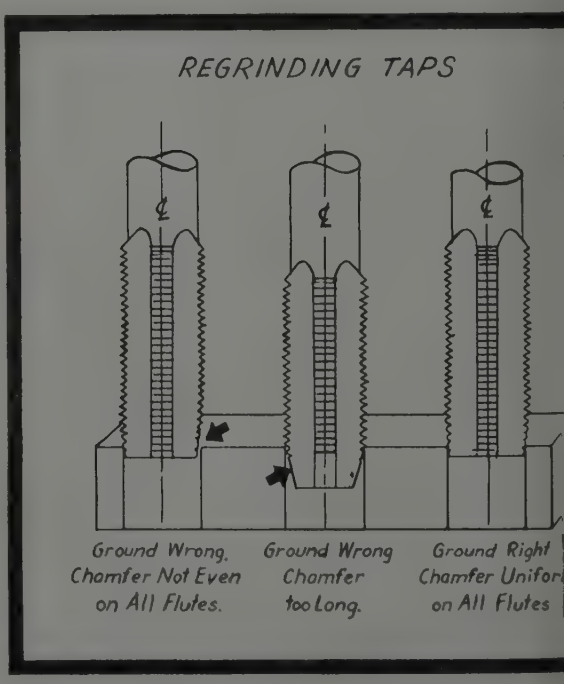

REGRINDING TAPS
Ground Wrong. Chamfer Not Even on All Flutes.
Ground Wrong Chamfer too Long.
Ground Right Chamfer Uniform on All Flutes

TABLE V REAMING SPEEDS AND FEEDS

Type No.	Surface Feet per Minute (Low and High)	Feed per Revolution for ¼—1-in. Reamers	Nearest Comparable Equivalent in Ordinary Steels
410	20/60	0.003/0.008	SAE-3140, 4140, 6140, etc.
420	20/60	0.003/0.008	SAE-1095, 3150, 3312, 6150
420F	30/100	0.003/0.008	SAE-2315, 2340, 2345
440	20/60	0.003/0.008	High Speed Tool Steel
440F	30/90	0.003/0.008	SAE-1060, 1070, 1095
443	20/60	0.003/0.008	SAE-8145, 3250, 4650, 6150, etc.
302	20/60	0.003/0.008	Copper-nickel alloys—except that 302 work-hardens
416	30/120	0.003/0.008	SAE-1030, 1120, X1340
430	20/60	0.003/0.008	SAE-3140, 4140, 6140, etc
430F	30/120	0.003/0.008	SAE-1030, 1120, X1340
329	20/60	0.003/0.008	Copper-nickel alloys
303	30/100	0.003/0.008	SAE-3120, 3145, 4615

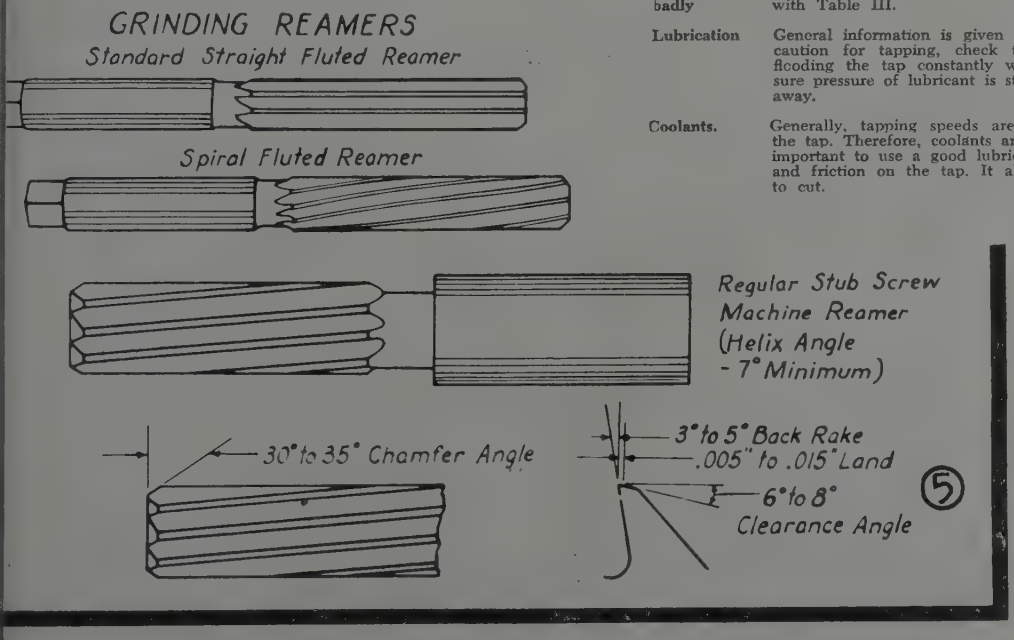
NOTE: The above speeds are average. For some jobs the higher speeds may be used and on other jobs, depending on the type of work, it may be preferable to use speeds on the lower side. The higher speeds are generally used for sizing work and the lower speeds for smooth finishes. All recommendations are based on the use of standard high speed tools.

TABLE VI REAMING CHECK CHART

TROUBLE	CORRECTION
Cutting edges burn.	Check spindle speed. It may be too fast. Check lubrication as it must also be good coolant. You may be using too rich a mixture and need paraffin to thin it out, which is helpful in carrying off heat.
Cutting edges wear badly.	Check lubricant as it may be too rich in sulphur base oil and needs to be thinned out. Sulphur is abrasive and if your mixture is heavy, it will wear away cutting edge rapidly. See Lubrication. Part III for "rule-of-thumb" governing judgment of mixture.
Hole cuts eccentric.	Check chamfer. It must be concentric with all flutes. A poor start means a poor job. Check alignment of work with tool. Misalignment may be due to poor work-holding fixtures. Fine chips and incorrect setting will also cause this trouble. Try using a "floating holder."
Rough finish.	If you know reamer is sharp and correctly ground and your lubrication is satisfactory, reduce spindle speed.
Chatter.	Check the lands, if using a straight fluted reamer. They may be too wide and are rubbing, which causes chatter. Also sometimes caused by dull reamer, or drilled hole too large which does not let reamer get a good bite. There is less tendency to chatter with spiral fluted reamers.
Work glazes or burnishes.	This occurs mostly when reaming 18-8 types. Reamer is not biting in deep enough to get good cut. Acts like letting a drill dwell and work-hardens surface of steel. Deeper bite will usually correct this fault.
Tool marks in finished reamed hole.	Reamer was ground with too coarse a wheel. Use finer grinding wheel and stone cutting edges. See Part III on stoning. It is characteristic for tools to leave the pattern of the grinding wheel on the part.
Reamer binds.	Check clearance and rake angles with Fig. 5. If reamer is within these limits, it will not bind. Wide lands or insufficient back-off angle can also cause binding.
Nicks in flutes.	This comes from careless handling and storage when not in use. Handle them as carefully as the reamer manufacturer does when he ships them to you. Store in individual boxes or racks with separations. Remember, the cutting edge is always vulnerable.

TABLE IV TAPPING CHECK CHART

TROUBLE	CORRECTION
Loose fits won't meet tolerance.	Two factors cause this trouble. First, oversize drill holes. Was drill selected from an old "Standard Table"? These tables have errors, particularly on fine pitches. Check drill size with formulae given under tapping. Second, are you using a cut thread tap when a ground thread tap is needed? Remember, a cut thread tap seldom is suitable for anything but Class 1 fit. Commercial ground taps cut Class 2 fits. Precision ground taps cut Class 3 and Class 4 fits. Be sure you are using the right type of tap for the job.
Tapped holes not consistently accurate.	Usually due to tap holder taking slightly different angle each time. If you are using "floating" holder, check how much it wobbles. Often changing to an accurate, rigid holder overcomes this trouble. Check flutes; if shallow, chips will pack causing tap to cut oversize.
Tap overloading caused by pick-up.	Loading or pick-up on tap surfaces causes most tap breakage. As soon as this is observed, it should be corrected. To let it go means the pick-up will finally be so great that tap will weld in hole and power of machine will break it. Check lubrication. Other causes of loading are lands too wide, chips packing in flutes, or dull tap.
Roughness in threads.	If all other factors and variables have been carefully checked, try a negative grind on the heel of the tap. This overcomes tap tearing threads when backing out.
Broken teeth.	Tap may be too hard for type of material being cut. Grind broken teeth entirely away and tap will be serviceable.
Loading on stringy soft metals.	This can usually be overcome by polishing the tap after grinding. The better the tap is polished, the less tendency for loading.
Flutes require regrinding.	See Fig. 3 for correct method and grinding wheel shape.
Poor threads and high tap breakage.	Fig. 4 shows right and wrong grinds on chamfer or point diameter. Proper grinding will help correct this trouble.
High power consumption and quick dulling of tap.	Chamfer ground even but point diameter too small, throwing all the load of cutting on too small a portion of the chamfer. See Fig. 4. Check hardness of tap—may not be hard enough for type of material being cut.
Tap slows up. More power required.	Generally an indication of improperly ground or dull tap. Check hole diameter. Drills may have worn enough to be cutting undersize. Check to see if axis of hole and tap are parallel. Check for chips packing in flute. This can develop if flutes are shallow or lands too wide. Chips can be controlled perfectly, and are, in well designed and correctly ground taps. Power required to break chip packing is often more than required to tap. On deep holes this will break taps.
Tap cuts when backing out.	This is usually caused when tap cuts oversize hole, leaving no support for tap when backing out, thereby permitting it to cut. A "floating" tap holder or wobbly spindles contribute to this condition.
Tap runs hot; dulls too fast.	This invariably is due to tapping speed being too high. Check with Table III for recommended speed.
Tap drags badly	Usually a sign of tapping speed being too low. Check with Table III.
Lubrication	General information is given in Part III. As added precaution for tapping, check to make sure lubricant is flooding the tap constantly while it is in the hole. Be sure pressure of lubricant is strong enough to wash chips away.
Coolants.	Generally, tapping speeds are not fast enough to heat the tap. Therefore, coolants are not necessary. It is more important to use a good lubricant that will prevent wear and friction on the tap. It also reduces power required to cut.


GRINDING REAMERS
Standard Straight Fluted Reamer
Spiral Fluted Reamer
Regular Stub Screw Machine Reamer (Helix Angle - 7° Minimum)
30° to 35° Chamfer Angle
3° to 5° Back Rake
.005" to .015" Land
6° to 8° Clearance Angle
5

Heretofore not much data have been available on fatigue characteristics of higher carbon and higher alloy steels used in completely hardened martensitic state and subjected to compressive loads. The author here reports metallographic observations of subsurface changes in structure and their effect on fatigue life

EFFECT OF STRUCTURAL CHANGES IN STEEL ON . . . fatigue

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MUCH information has been accumulated and a great deal published regarding the fatigue of metals, referring particularly to the lower carbon and alloy steels. However, little data have been available on the fatigue characteristics of the higher carbon and higher alloy steels used in the completely hardened martensitic state and which are generally subjected to compressive loads.

One of the steels of the type above mentioned is the high carbon chromium steel now designated as SAE 52100, first specified by New Departure for their ball bearing races in 1913. This steel contains 0.95 to 1.10 per cent carbon and 1.20 to 1.50 per cent chromium. It is used hardened to a completely martensitic structure, rockwell 63 to 65 C, and as ball bearing race material is subjected to very heavy compressive stresses. Fig. 5 is a micrograph taken at a magnification of 1000, of the structure of a properly hardened ball bearing raceway. Note that the carbides are small and well distributed through the mass of the material.

In many instances ball bearing raceways are subjected to maximum compressive stresses exceeding 450,000 psi; under special circumstances these stresses may run as high as 750,000 psi., and yet the bearings themselves are expected to provide an endurance life running into years of successful operation.

Ball bearings are unique as rotating load carriers in that, when used in accordance with good engineering practice in salutary surroundings, failure does not occur through abrasive action, as is the case of the plain or friction type journal bearing. End of their life span is determined by the appearance of minute flaked or spalled areas in the raceways which to the bearing engineer are indicative of fatigue. The plan* and cross-section of a typical spall is shown in Fig. 7 taken at low magnification. If running is continued after appearance of the initial spalled arrea, eventually the entire race is flaked, looseness and noise develop, and replacement is required.

It is the purpose of this article to explain what happens to the internal structure of the bearing race during its life cycle up to the time when the external evidence of fatigue, that is to say, spalling of the race surface, occurs.

It is well known that the modern ball bearing employing grooved raceways as ball tracks carries the imposed loads on areas of definite and predictable dimensions. These areas are the result of minute deformations of the load-carrying members and constitute pressure ellipses of dimensions dependent upon the curva-

* From data prepared by the author for 1946 meeting of American Society for Testing Materials at Buffalo.

Fig. 1—Typical troostitic areas observed after running ball bearings under constant load and speed for 100, 200, 300 and 400 hours, A, B, C, and D respectively

Fig. 2—Conditions existing after operation under various loads

Fig. 3—Structure in center of troostitic area of bearing illustrated in Fig. 4D. Magnification 1000X

Fig. 4—Formation of troostitic areas in highly stressed bearings. Magnification 50X. A—66 hours, B—91 hours, C—207 hours, D—312 hours

Fig. 5—Structure of properly hardened ball bearing raceway. Magnification 1000X

Fig. 6—Effect of load intensity on depth of troostitic area from pressure surface. Magnification A—15X, B—1000X

Fig. 7—Plan and cross-section of typical spall, taken at low magnification

Fig. 8—Section cut transverse to race groove

Fig. 9—Condition when ultimate fatigue life is approached, showing gray lines through troostitic areas

Fig. 10—Circular band viewed on longitudinal cut

A
B
C
D
2
life of bearings
3
A
B
C
D
4
5
A
B
6
A
B
7
8
A
9
B
10

tures of the raceways, the loads imposed, and the elastic properties of the steel used. The average stress over the elliptical area of contact is readily computed; maximum stress at the center of the pressure ellipse is one and one-half times the average stress.

It is of course recognized that the repetition of these stresses over long cycles of rotative life must in some way be the cause of eventual bearing failure. Remembering that the initial hardened structure of the raceway is purely martensitic with well-distributed carbides, that the steel itself is remarkably free from inclusions and segregations and is manufactured under the most rigid control, it is well now to examine what happens to that structure when subjected to endurance testing under load.

New Departure has, since its earliest days, maintained extensive laboratories equipped to run ball bearings under carefully controlled conditions of load, speed, lubrication, temperature, etc. In the continual search for knowledge regarding the mechanism of fatigue in ball bearings, metallographical examinations were made of the structure of the race material in the neighborhood of the spall in bearings run to failure under controlled laboratory conditions.

As a result of these examinations, it became apparent that certain changes were taking place in the metallographic structure of the steel which appeared to bear a very definite relation to the fatigue life of the bearings. This structural change appeared in the form of areas of troostite concentrated some (*Please turn to Page 97*)

Fig. 11—Section through point of maximum troostite concentration in same bearing run for 4307 hours under a 3000-lb load

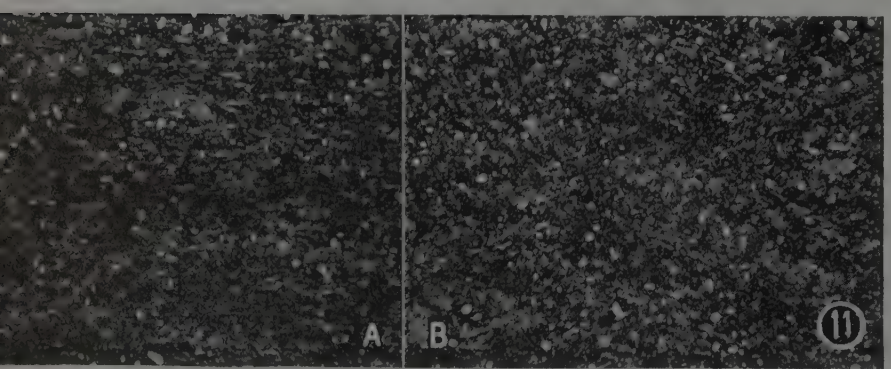
Fig. 12—Lines of equal shear stress in ball bearing race in plane of minor axis of pressure ellipse

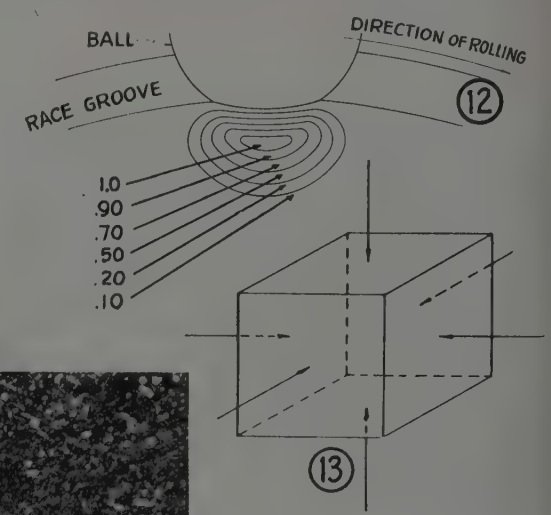
Fig. 13—Illustration of elementary body compressed on all sides

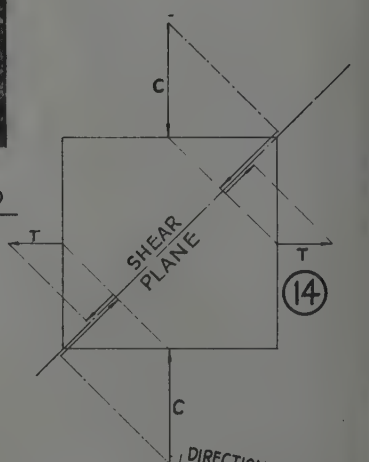
Fig. 14—Shear stresses created on plane oblique to normal stresses

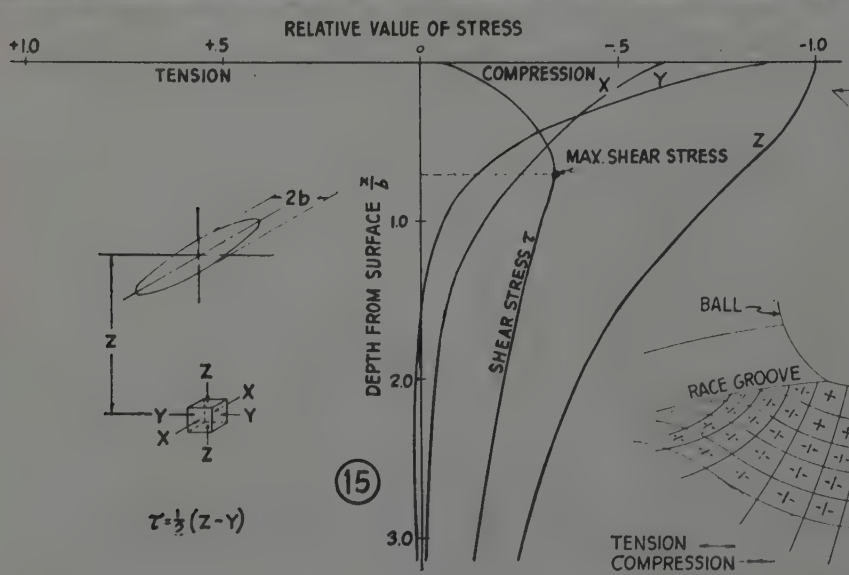
Fig. 15—Variations in vertical and horizontal principal stresses directly below center of pressure area

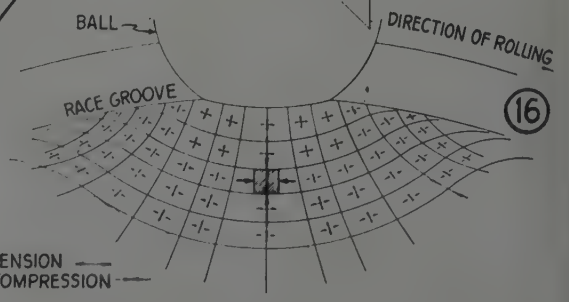
Fig. 16—Distribution of tensile and compressive stresses below pressure area in ball bearing











Engineering News *at a Glance*

WELDING "loom" is the appropriate name of an ultra high-speed welder being manufactured by Thomson Electric Welder Co. at Lynn, Mass. According to the company, the unit can be compared to a textile weaving loom when welding wire mesh. Spacing, welding pressure and current dwell are preset to suit the design or mesh desired, and a high speed "shuttle" flies back and forth making row after row of perfect spot welds. The machine can be set up with 25 electrodes arranged to weld up to 25 longitudinal wires spaced as desired across maximum width of 48 in. Longitudinal wires can be fed into and through the machine continuously, and spot spacing can be varied from a minimum of 1½-in. between welds up.

ACCORDING to a compilation prepared recently by Automatic Transportation Co. of Chicago, a total of 1556 of the company's motorized hand trucks have been installed by 444 leading metal products and refining companies, and are now at work in 541 plants operated by these firms. Largest single metals industry user is a tin products company, using 48 of the units in its 20 plants. Largest single user is a manufacturer of electrical equipment, employing, in its 19 factories, 179 Transporters. During the 4½ years since the introduction of this hand motorized truck, the company manufactured and sold 9900 units.

TWO novel German metal cutting machines, one for profile milling and the other for tool grinding, are covered in a report now available to manufacturers from the Department of Commerce, Washington. The profile milling machine works on the principle of a compound pantograph with a ratio of 1 to 1 between the cutter and stylus. The cutter duplicates an exact profile from a prepared template, including irregular profiles of any desire form. Feature of the miller is an optical device to prevent excessive gouging of the material while it is being cut by the stylus. Any excessive pressure by the stylus causes a light beam to be deflected from a bull's eye on a frosted glass screen. Feature of the tool grinder is a method for mounting the slides on antifriction roller bearings. This is said to provide easier and more flexible grinding adjustments.

AUTOMATIC painting-drying system now in use at Westinghouse's Micarta Division is fairly close to perfection. At the rate of 250 per hour, refrigerator panels of plastic are washed, covered with a prime coat of paint, dried, given a final coat and trim, then baked to a shining enamel finish—all without a human hand entering the process. Each thoroughly scoured panel rides to the spray booth on a conveyor. Its arrival is announced by an electric eye which starts four spray guns painting first one then the other side. Next the panel moves into a chamber banked with several hundred infrared lamps that dry the first coat thoroughly and rapidly. From there it travels into the path of another set of electric-eye-operated spray guns that apply the final coat and trim. Trip is completed through a gas-fired oven in which a series of four closely-regulated temperatures bake on a smooth finish. Mechanical conveyor then returns panel to the punch press where it is blanked and pierced ready for shipment.

AN ordinary industrial crane truck is used by one railroad company to move passenger locomotive tenders, 52 ft long and weighing 85 tons, Elwell-Parker Electric Co. disclosed in Cleveland recently. Tenders are towed at the end of a long steel cable to the repair department. There, after one end of the tender is lifted by means of an overhead crane, and its wheel-trucks detached, the steel cable is attached to the wheel-trucks and towed out from under the tender.

WITHIN 5 years, General Electric Co.'s chemical department at Pittsfield, Mass., predicts autos, refrigerators, ranges and hospital equipment will be finished with a silicone paint that will retain its original color and gloss indefinitely. The new paint is now in development stage. A 3-year test of silicone-painted panels conducted under severe weather conditions, left the panels practically unaffected, the company states. Tests in which panels were immersed in acid and alkali solutions reveal the product retains all its original characteristics.

RADICALLY new electronic vacuum measuring gage, designed for operations requiring continuous and accurate measurements of reduced pressures as low as 0.1 micron, is reported in production by Radio Corp. of America, and is expected to be available sometime in October. According to the Camden, N. J. company, the gage is designed especially for vacuum systems in which rotary pumps are used to back oil diffusion pumps. It is capable of indicating continuously the pressure while the mechanical pump is rough pumping, and serves to show the somewhat critical point at which the diffusion pump should be connected.

FROM New York, United States Rubber Co. reports development of a boot that excludes dust from landing gear struts of civilian planes, protecting precision ground cylinders and pistons from effects of abrasive substances. Boot is corrugated to provide a bellows-like action, and to permit free movement of pistons. Manufactured of high-strength fabric, impregnated with oil-resistant synthetic rubber, it is split lengthwise and laced to permit removal for inspection. The company says it also can be used to protect moving parts of mechanical equipment in manufacturing plants.

PHOTOELECTRIC Controlled WELDING

Multiple spot welding of railroad car stiffeners is expected to increase production 3000 per cent

HUGE new multiple spot welding machine utilizing an electric eye attachment is expected to increase production 3000 per cent at the Chicago car works of Pullman-Standard Car Mfg. Co. Weighing more than 90,000 lb, and said to be one of the largest of its type, the machine was built by National Electric Welding Machines Co., Bay City, Mich., to weld stiffeners to the interior of railroad car sides. Stiffener involved is a sheet of light gage corrugated metal.

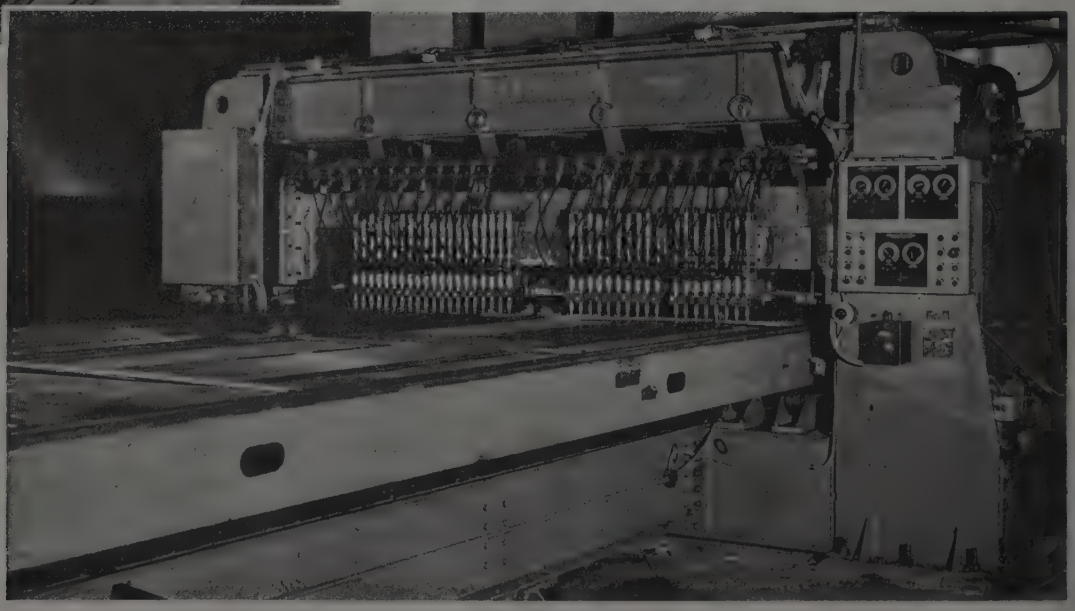
In operation, a metal table 10 x 30 ft travels beneath a battery of 48 stationary welding electrodes. Work to be welded is laid flat on the table, which is covered with a copper plate. As table moves slowly beneath row of spotwelding electrodes it is adjusted to stop at proper intervals; electrodes are lowered automatically, making contact with the work and welding stiffeners to the car side. Electrodes are then raised and the table moves to the next position.

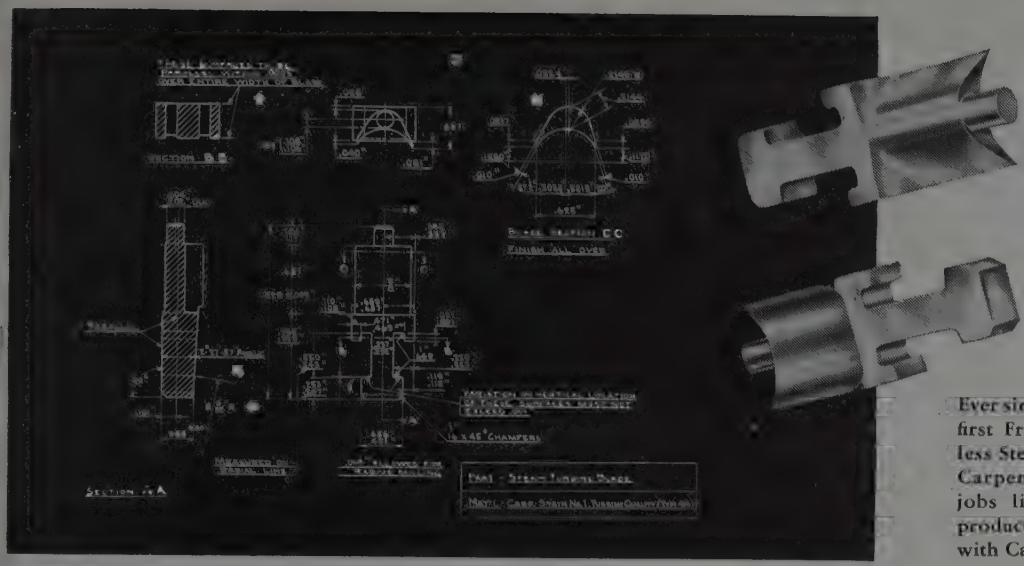
Electric eye arrangement makes the operation entirely automatic. Along one side of the table two rows of small holes about ¼-in. apart are drilled. Electric eye beam is directed from beneath the table through these holes. When beam strikes photo-electric cell above the holes, the circuit is completed, stopping the table and completing the other operating sequences mentioned above. By dropping loose rivets into all holes not needed in the operation, position of welding is preset.

Just as corrugation on the interior of a cardboard box supports the sides, a stiffener welded inside the walls of a car lends strength and smoothness. While first fabricating procedure employed single, stationary spot welders making one weld at a time, application of multiple spot welding to this work was developed during the war.

Fig. 1 (left) — Small pins are removed from side of movable bed to permit electric eye ray to pass through from below, completing contact with photo-electric cell units shown in background just above holes

Fig. 2 (below) — Battery of electrodes makes possible any number of welds, up to 48, at a single stroke. Table moves under electrodes, stopping at proper position while electrodes drop and make welds





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Hot-Dip Galvanizing Practice

Fig. 27—Galvanizing cross arm braces in 12-ft electric galvanizing kettle

By WILLIAM H. SPOWERS JR.
President
Spowers Research Laboratories Inc.
New York

FLUXES, from a metallurgical viewpoint, are substances used to promote fusion of metals. In hot galvanizing, they are used more specifically to promote alloying of fused zinc with unfused iron or steel. Broadly speaking, fluxes promote proper alloying and, in the case of hot galvanizing, serve as cleansing agents. This, at least, is the historical conception of their function. Frequently they are required to remove oxides from the iron or steel to be galvanized, as well as from the molten zinc.

Modern hot galvanizing practice recognizes important limitations in the foregoing conception of fluxes and fluxing. An essential condition concerning the proper alloying of zinc with iron to form the hot galvanized coating is the absence of oxides of these metals. The pickling operation is intended to free the iron or steel of its oxides. Modern fluxes are designed to keep thoroughly pickled, oxide-free iron or steel in a substantially iron oxide-free state until the work is alloyed with the zinc. This theory calls for the use of fluxes which, in their unfused state, have the least possible direct attack on the iron or its oxides. In the fused state, such fluxes should dispose of any small amounts of oxides of iron or zinc which may occur.

Hydrochloric (muriatic) acid, used alone or with ammonium chloride (sal ammoniac), is a flux of the cleansing type. Zinc ammonium chloride, and, to a small extent, zinc chloride, are the more modern fluxes of the protecting type. Both types have their limitations and special conditions in use, although practically all sorts of commodities can be galvanized by each. A description of these materials and the methods of their use will lead to a clearer understanding of their advantages and limitations.

Ammonium chloride, a crystalline material, is the most broadly used fluxing agent. Its old name, sal ammoniac, is commonly applied. It is produced from the crude ammonia liquors obtained in by-product coke manufacture by the ammonia-soda, or Solvay process, and by direct combination of ammonia gas with hydrochloric acid. The two latter processes produce the purer product, white and of uniformly small crystals. The commercial forms of sal ammoniac, appearing somewhat gray or brown, derive their color generally from slight traces of tarry particles carried over with the crude ammonia liquors from which they are made. This commercial type is allowed to form larger crystals, which are preferred by many galvanizers. Satisfactory quality can be assured by using sal ammoniac containing not over 1 per cent nonvolatile matter, free of sulphates or iron and containing not over 0.05 per cent of material insoluble in water.

Zinc chloride is available as a solid in either a granular or fused state, or as a water solution of the salt. In the solid forms, it should be substantially white in appearance; mere traces of iron present will cause green or brown tinges. Zinc chloride is the end product of the direct action of hydrochloric acid on zinc metal, but the salt generally available is not made from these virgin materials. Commercial zinc chloride is produced most frequently from zinc by-products or from waste material of other industries, but nevertheless, it can be and should be as pure as if manufactured from virgin materials.

Slight traces of sulphates, iron and heavy metals are to be expected and can be tolerated. Zinc chloride in any form absorbs moisture readily, consequently it should be kept in water-tight containers at all times. It is corrosive to the skin, so that rubber gloves should be worn when it is being handled. Commercial zinc chloride solutions ordinarily have a specific gravity of 1.5263 (60° F) or 50° Be, and contains 47.4 per cent zinc chloride and 52.6 per cent water. Solutions may be obtained commercially with as much as 69.4 per cent zinc chloride (70° Be), but since such solutions will freeze at about 27° F their broad use is limited. Less concentrated solutions usually are prepared by the consumer adding water to the more concentrated solutions.

Common methods of producing zinc chloride yield the salt in a liquid state. Water is removed by evaporation to leave a liquid of suitable concentration or a granular solid or finally a fusion. Unless proper steps are taken in the process, such zinc chloride will still contain free hydrochloric acid, which is not helpful to galvanizers. This is controlled by using some zinc oxide during manufacture, so that the end product is slightly basic, preferably not over 0.5 per cent, expressed as zinc oxide. As a concentrated zinc chloride solution is diluted with water, basic forms of zinc chloride appear as solids, s

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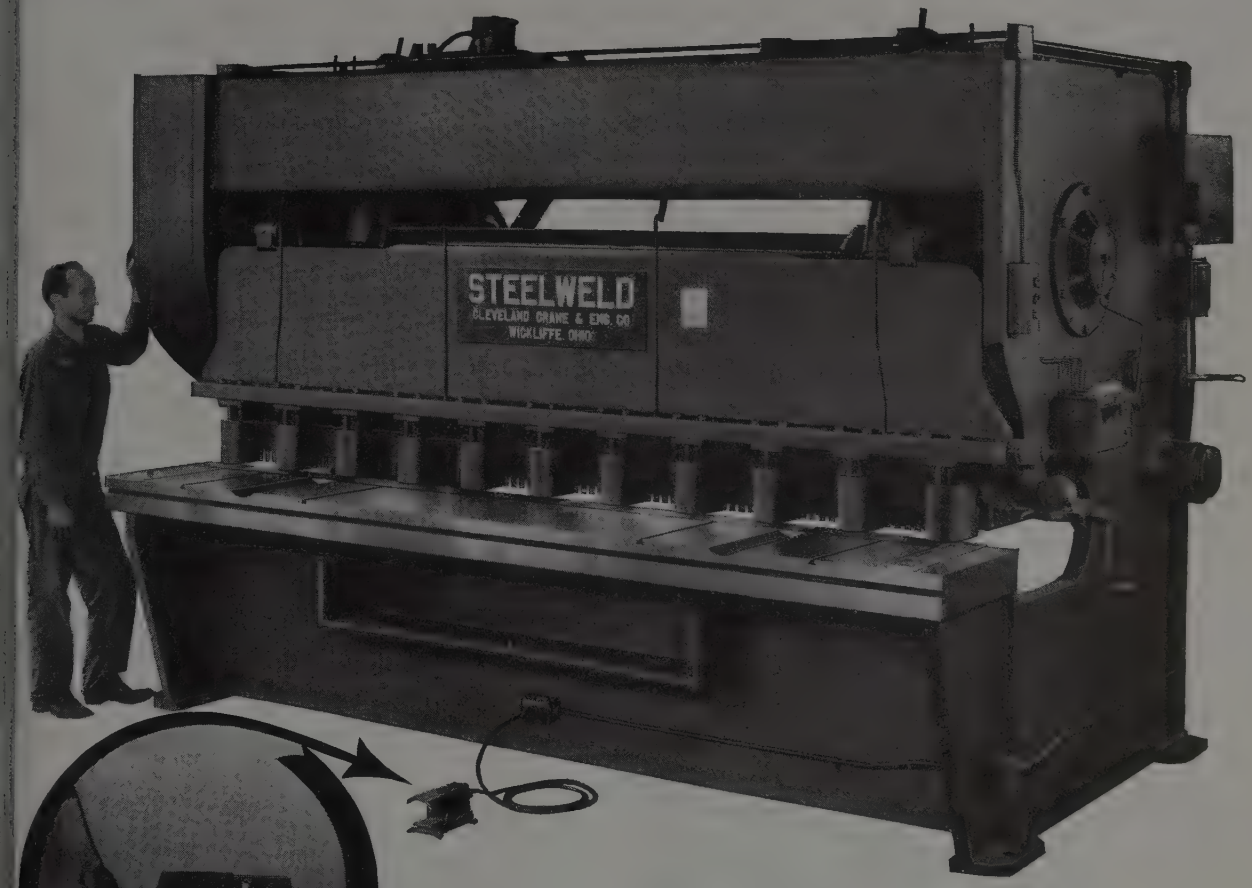

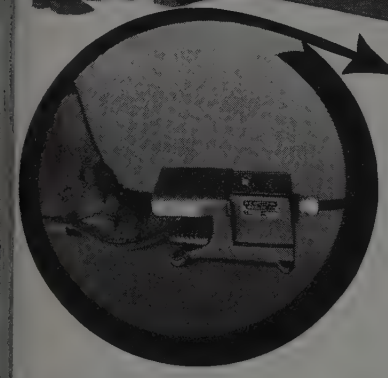

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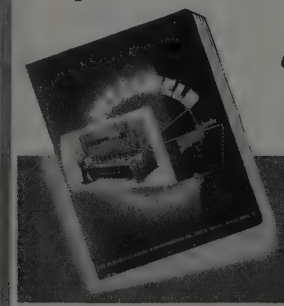

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STEELWELD PIVOTED BLADE SHEARS

that any test for the presence of water-insoluble impurities should be made in strong solutions of approximately 1.5263 specific gravity, at which point all should dissolve.

Zinc ammonium chloride is the name of a double salt consisting of zinc chloride and ammonium chloride. There are two such double salts, which are definite crystalline chemical compounds rather than mechanical mixtures. One form contains, theoretically, 56.04 per cent zinc chloride and 43.96 per cent ammonium chloride, combined in the ratio of one molecule of zinc chloride with two molecules of ammonium chloride. This 1:2 type can be and is used as a flux, but is not so satisfactory. It absorbs water readily and is lacking in ammonium chloride, the more desirable constituent. The other form contains, theoretically, 45.94 per cent zinc chloride and 54.06 per cent ammonium chloride, combined in the ratio of one molecule of zinc chloride to three molecules of ammonium chloride. This 1:3 crystalline compound does not absorb water readily, is stable and preferable as a flux. It is the form of compound meant when the term "zinc ammonium chloride" is used herein.

Zinc ammonium chloride should be white, dry and entirely soluble in water. It is manufactured by bringing together the two chlorides produced separately, at proper concentration and temperature in water solution when the definite compound desired will appear as crystals [4]. Impurities should be substantially absent, iron as oxide seldom being present to the extent of 0.01 per cent.

Hydrochloric acid, the muriatic acid of commerce, is readily available of high quality suitable for galvanizers. The familiar 20° Be acid of commerce is probably preferable as containing less water and being more stable at the usual temperatures of transportation and storage.

Principles of Fluxing

Ammonium chloride and hydrochloric acid have been used to develop the most familiar methods of fluxing various types of products and consequently have been the basis for establishing cost and quality. New ideas concerning fluxing methods and materials are discussed first in comparison with the existing knowledge built up from the long use of the hydrochloric acid-sal ammoniac method. The latter has been studied for improvement in the sal ammoniac flux itself. Many writers have urged the use of zinc chloride or some form of zinc ammonium chloride. It has become a fairly broad practice to use these materials instead of sal ammoniac. The most advanced revision of the process uses these materials to replace either or both the hydrochloric acid and sal ammoniac. Unfortunately for the production of high-quality hot galvanizing the same idea of a flux, being largely a cleansing agent, has limited the beneficial results which are inherent in this substitution when made properly.

The hydrochloric acid-sal ammoniac method attracts because it is simple and direct. In the preparatory stages the work passes from acid to acid to flux in such a way that a failure to clean the work properly in one operation permits correction of this in one of the latter operations. Since hydrochloric acid is generally used just prior to passing the work through the sal ammoniac fusion hydrochloric acid either as a liquid or a gas does the final cleaning. To most operators this process appeals because it always seems to give satisfactory results without requiring close supervision. Study shows, however, that the results merely are seemingly satisfactory. In fact many of the weaknesses considered inherent in hot galvanizing coatings are more truly inherent in the method used and are largely subject to control, if not complete elimination, by a careful study of a few points entailed in the practice of fluxing.

The hydrochloric acid portion of this treatment may be considered as part of the fluxing operation rather than part of the actual pickling stage. From this viewpoint the hydrochloric acid might be called a flux bath or wash and thus establish a better basis for considering the use of zinc chloride or zinc ammonium chloride. Zinc chloride generally has been used as a flux bath replacing the hydrochloric acid and to a smaller extent the same has been done with zinc ammonium chloride. Considering the hydrochloric acid step a flux bath rather than an essential part of the pickling gives a different conception of the importance of the preparatory stages to actual dipping in the zinc and finally leads to an understanding of the advan

[4] The System Zinc Chloride-Ammonium Chloride Water, by P. A. Meerburg, *Zeit fur Anorganische Chemie,* vol. 37, p. 199.

Fig. 28—Galvanizing kettle in foreground being used for zinc-coating angles. Pickling tanks are located in background

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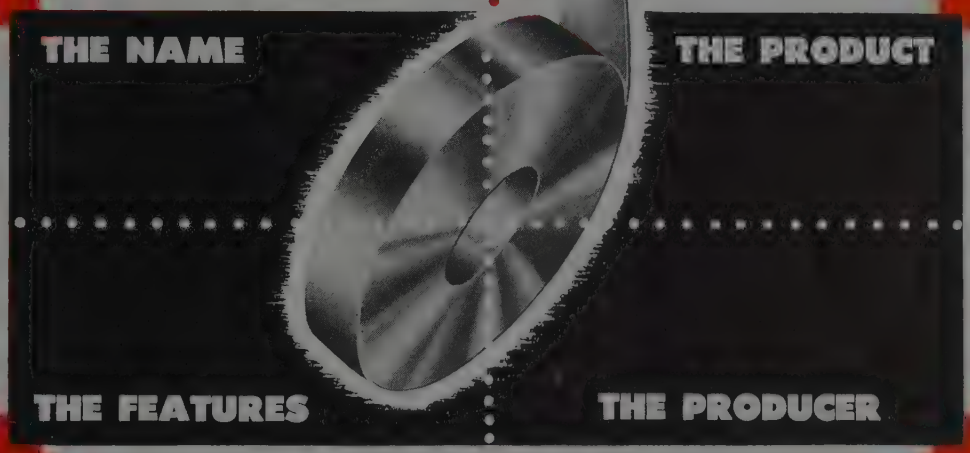

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tages obtainable from the elimination of the hydrochloric acid step from the galvanizing process. The economic advantages are obvious.

Since the object of pickling is to cleanse the work thoroughly of oxides and other inert materials, which prevent proper alloying of the zinc with the iron, it is proper and economical to do this completely in a single step. This is accomplished by the careful selection of the acid used, its strength, temperature and time. General practice, as developed by experience, is fairly standardized for various types of work and sulphuric acid is used most generally.

Rinsing the commodities in water after pickling is of utmost importance. Too frequently the water in the rinse tank is stationary or is renewed at infrequent or irregular intervals. Some galvanizers have provided for a constant flow of water through the rinse tank but this flow usually is so slight and improperly placed as to be of relatively little value. The consequence is that the pickled work is not rinsed entirely free of the sulphuric acid and ferrous sulphate brought over from the pickle tank. In most cases the pickled work is rinsed in what is, in fact, a more dilute pickle and it passes on to the next step carrying appreciable amounts of free acid and ferrous sulphate. A sufficient flow of cold water should be used to assure complete removal of all acid and ferrous sulphate and thus deliver the work cold and clean but wet to the next step, which is fluxing.

Rinsing in cold water is preferred because the cold, completely rinsed work will not dry and rust in the normal time involved in transferring the work from the rinse tank to the flux wash tank. Hot rinse water will remove traces of the pickle more readily, but the freer use of cold water is less apt to lead to oxidation of the freshly pickled surfaces which always occur the moment they become dry. While it may appear economical in the pickling operation to attempt to save the heat imparted to the work by a hot rinse, consideration must be directed to the caution just given. The use of hot zinc ammonium chloride flux washes is a preferable method of preheating the work.

Sal ammoniac scattered on the surface of molten zinc volatilizes and momentarily exists as ammonia gas and hydrochloric gas, the latter attacking the zinc to form zinc chloride. Other more complex compounds are formed such as zinc ammonium chlorides and ammoniated zinc chlorides which, with the zinc chloride, provide the permanent fusion. This fused mixture and frequent additions of fresh sal ammoniac constitute the familiar kettle flux. It is largely a mixture of fused chlorides and with molten metallic zinc as one pole and the entering work of iron as a second pole an electrolytic cell is provided in which the flux fusion is the electrolyte.

ANOTHER CASE OF "TWO BIRDS": Method of preventing distortion during multiple torch cutting operation is shown in this photograph of arc welding and flame cutting at the same time, at Service Welding Co., Ridgefield, N. J. After the four torches of the 6A Oxygraph make their cuts in the outer edge of the ½-in. steel plate, welder follows along making tack welds at the point of entry, restoring steel to one continuous strip, and precluding possibility of "walking" or "lifting." Photo courtesy Air Reduction Sales Co.

Dissolved Iron Precipitated

It is well known that iron dissolved in cold acqueous electrolyte, such as zinc chloride, will be precipitated as metallic iron if a piece of metallic zinc is introduced into the solution. Except for the presence of heat and the absence of much water the foregoing conditions are parallel and the result seems obvious. That is, any iron carried into the sal ammoniac flux fusion on the work as iron chloride from the hydrochloric acid, is decomposed and the metallic iron is released to alloy with the molten zinc and form dross. If some oxide of iron is present on the entering work then it is customary to hold the work in the flux fusion until the oxide is cleaned off. In this case the hydrochloric acid and gas from the volatilizing sal ammoniac converts this oxide to chloride and the previously mentioned electrolytic action then takes place. Chemical analyses of spent sal ammoniac fluxes over a period of years show only a relatively small amount (of the order of 0.01 per cent) of iron so that the iron chloride does not remain in the flux unaltered. Stopping the supply of iron chloride coming to the flux always leads to a material reduction in the quantity of dross made.

If the use of hydrochloric acid leads to these conditions, why not replace it

(*Please turn to Page* 102)

SAFETY X-RAY CODE Protects Workers

American Standards Association code covers requirements for installing, operating and maintaining x-ray and radium equipment which is seeing increased service and wider use with new procedure in industry

RAPID increases in the utilization of x-rays and radium in war production gave rise to a great need for additional safety standards governing this type of work. Publication of a safety code by the American Standards Association, New York*, covering industrial use of x-rays and radium was the answer to the realization that risks were greater and that it was impossible to trust operation of equipment to thoroughly trained personnel. The code covers safety requirements for installing, operating and maintaining such equipment.

Scope of the problem may be realized when it is known that more x-ray film was exposed for radiographic examination of airplane parts in the last few months of the war than was used in the entire medical profession in the same period. Development of a wide range of applications, especially for the x-ray, meant tube voltage increases to as high as two million volts, sufficient to bring about greatly increased potential hazards.

Primary Potential Hazards

Primary potential hazards in the use of x-ray equipment are radiation and electric shock, with degree of exposure depending to a large extent upon design of equipment and method of operation. With the trend toward self-contained units, the shock hazard is definitely controlled as high voltage equipment is enclosed. Noncurrent-carrying parts may be grounded and interlocks are used to prevent contact with energized parts. Although attempt has been made to control the radiation, many operations do not lend themselves to foolproof control of this hazard.

Indispensable to modern industry is the x-ray diffraction method of crystal analysis. In the hands of the metallurgist, chemist, or physicist, it is an instrument for the submicroscopic exploration, identification and control of many products and processes. As these units are usually self-contained, they are more readily adaptable to protection against electric shock. Due to the nature of the operations, protection against radiation is more difficult. The skill of the operator cannot be relied upon for protection against exposure to the intense primary beam. The new ASA standard specifies detailed instructions for x-ray tube housing and arrangement of shutter and collimating systems, as well as special rules for production work radiation measurements.

The use of the x-ray in the examination of large castings, welded seams in pressure vessels, tanks, etc., requires a means of protecting the workers not only in the vicinity but in adjacent buildings as well, as voltages often run as high as one million. Operations of this nature require either a leadlined room into which no one is permitted while the machine is energized or, where a mobile unit is used, a lead shielded booth for the operator.

Part III of the code covers general methods and materials for use in construction and arrangement of protective barriers and enclosures. Included in this section of the code are curves and tables which give thicknesses of protective materials required for barriers and classifications of tube housings with respect to the degree of protection afforded as determined by the dosage rates of radiation at specified distances from the tube.

Three Types of Energy

Three distinct types of energy are liberated in the spontaneous disintegration of radium. Of these, the alpha and beta rays have relatively great amounts of energy but their penetrating powers are not as great as the third, the gamma rays. The metal capsule containing radium as it is used for industrial applications absorbs the alpha and beta rays but affect the gamma radiations but little.

With gamma rays and x-rays being of the same nature, except for difference in wave length, the capsule containing the radium salt may be considered analogous to the x-ray tube as the source of radiation for industrial radiography. Although gamma rays have greater penetrating power because of shorter wavelength, their use is limited because of low volume of intensity compared with x-rays and because of its high cost.

Industrial use of radium is confined to nondestructive testing by radiographic recording on photographic film. Although the time required for exposure by gamma radiography of heavy metal thickness is much greater than that for x-rays, it requires no other apparatus but the radium capsule, film, intensifying screen and equipment for handling and mounting of the capsule. The entire circumference of circular-shaped objects may be radiographed on a single exposure by placing the capsule in the center of the object.

The potential dangers involved in the use of radium are radiation and radium poisoning, the latter resulting from introduction into the body of the radium substance by inhalation or ingestion. Gamma ray emission is continuous and cannot be altered by external means. This characteristic necessitates different procedures in application as compared with x-ray equipment. Radiation received by any part of the body depends upon three things: Distance from radium to part of body exposed; amount of radium in the holder. and the time of exposure.

Radium poisoning due to ingestion or inhalation of radium as used in radiography is unlikely unless the salt should be spilled by accident, as capsule is hermetically sealed. Part II of the ASA code sets up standards for the use, handling and storage of radium in industrial radiography. Requirements for remaining within the daily permissible doses of radiation while transporting or handling the radium are stipulated in the safety code.

Although original installations may measure up to standards, it is important that when changes in operating techniques take place, or new equipment is installed, or when wear affects operation, the entire installation undergoes an inspection of its protective devices and a rechecking of radiation hazards. These potential hazards are controllable when ASA code requirements are met and kept.

* From a discussion by S. Dahlberg and R. P. Gleason in collaboration with S. J. Nilson M.D., which appeared in the May, 1946 issue of Industrial Standardization.

Use of BRONZE WELDING in repairing a draw bench cylinder

BRONZE welding an 8½-ft crack in the main cylinder of a 280-ton draw bench not only saved six to eight weeks of production for a southern forge shop but saved a considerable sum in repair costs compared with cost of a new cylinder. Process of welding the crack in the 5-in. thick wall of the 16-ft casting is worthy of note, as it cut down the time the machine was out of service.

About 500 lb of metal was removed from the casting by chipping and grinding in preparation for welding, representing about 31 hours of company time for the work (note Fig. 2). One end of the cylinder was then raised higher than the other to provide a 15 degree slant so molten puddle during welding could be controlled easier.

A preheating furnace was built around the cylinder and covered with sheet asbestos. Cylinder was preheated with city gas for 8 hours prior to welding.

Bronze-welding was continued without interruption for 32 hours by four operators working in shifts. Using Oxweld 25M welding rods, manufactured by the Linde Air Products Co., New York, for welding copper, brass, bronze, malleable iron, steel or cast iron, about 800 lb of metal were deposited. Brazo flux, made by the same company, was also used. This flux is in the form of a coating on the rod, melting down with it into the molten puddle without "spalling" or burning off ahead of the flame. The rods may be heated to facilitate bending, or, as in this case, tacking the rods together, without completely burning off the coating.

The weld was started at end of crack nearest the center of the casting and was continued in one pass toward the other end. As the cylinder was positioned at an angle, the operator was able to maintain a puddle about a foot long as the weld progressed up the incline. Welding through the opening in the top of the preheating furnace is shown in Fig. 1.

Welding was started with a ¼-in. rod, but as the puddle grew larger and as the castings grew hotter, one ⅜-in. rod and finally two ⅜-in. rods were used, tacked together. Operator worked from one end of the puddle to other to keep the surface horizontal.

Upon completion of the welding process two weeks after the breakdown, the cylinder was left in the preheating furnace with burners turned off until it was completely cold. Bore was then checked and found to be within 0.020-in. of its original dimensions. This was within allowable tolerance and made further time loss for machine work unnecessary.

Use of this process saved a loss of 72,000 forgings out of a possible loss of 90,000, had it been necessary to wait for a new cylinder to be delivered. Bronze-welding thus effected an 80 percent savings in production for this forge shop which used the draw bench cylinder to press hot forgings through a die so that an internal hole and the OD

(*Please turn to Page* 105)

Fig. 1—Bronze-welding through opening in top of preheating furnace.

Fig. 2—Crack in main cylinder of draw press veed out prior to welding. About 500 lb of metal was removed by chipping and grinding

Fig. 3—Completed weld after 800 lb of metal was deposited. Bore was found to be within 0.020-in of its original dimensions

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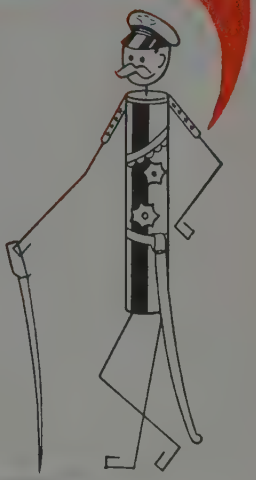
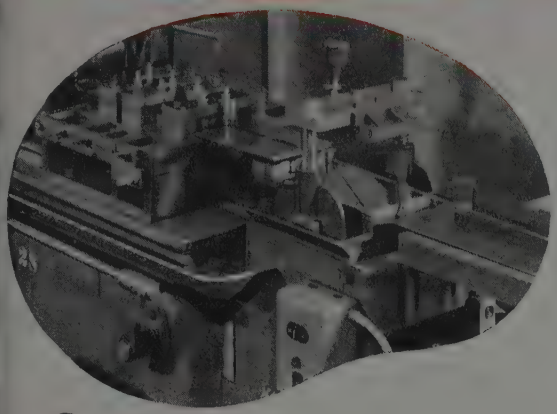
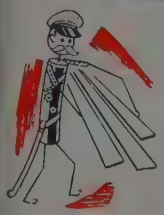




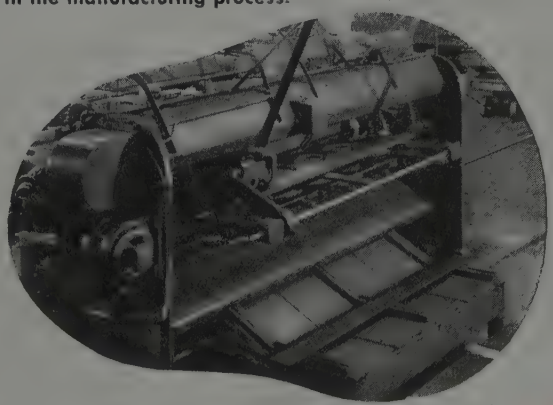
STEEL EDGED AS YOU WANT IT

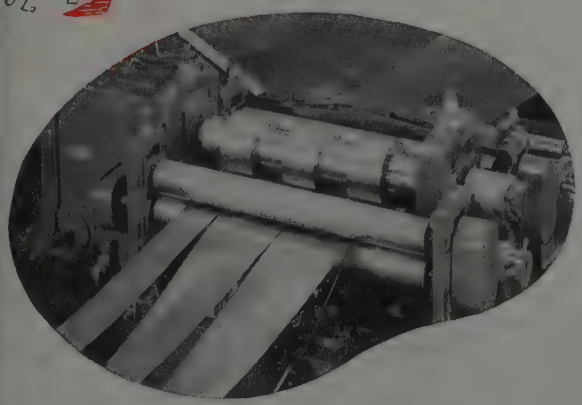
Heavy-duty edgers used at the Gensco Plant are manned by skilled steel warehouse men. Strip steel can be round edged to your exacting requirement. To the user this service frequently means a reduction of one or more steps in the manufacturing process.



STEEL SHEARED TO ANY SIZE . . .

Sheet and Strip Steel can be sheared in any size to the customer's specifications. Many steel users prefer this Specialized Gensco Steel Service.





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GENERAL STEEL WAREHOUSE CO., INC.

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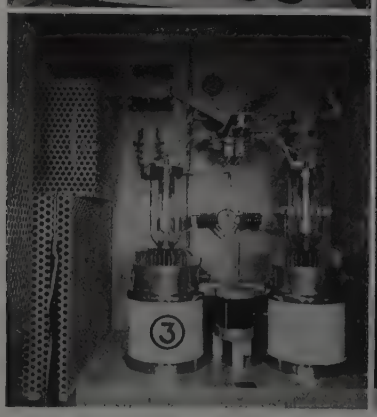
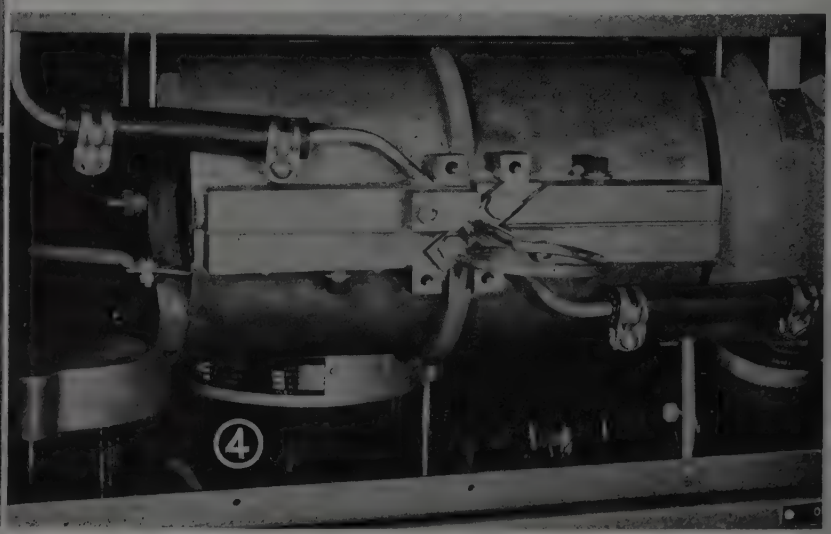
Induction Heating with Electronic Generators





CURRENT of a frequency between 100,000 and 1,000,000 cycles per second is usually used in induction heating, the material to be heated being placed in or near a water-cooled inductor coil which is usually copper tubing through which the current passes. Heat is generated by the magnetic field of the coil which induces currents in the work material, causing it to heat.

Better control and quicker processing is attained as the heat, instead of being applied from the outside and forced to "soak in", is generated in the material being heated. Use of this form of heat treating makes heating of associated elements and surrounding air unnecessary and gives greater comfort and efficiency to workers.

Knowledge of the fact that high frequency currents travel on the surface of a metallic conductor makes possible close control of the depth of treatment by computing kind of material, frequency, power and heating time. High frequency current used in case hardening permits "self-quenching"—the necessary quick cooling of the heated "skin" by conduction of heat to the relatively cool interior of the piece.

Of special importance in processes which call for absolute control of temperature and localization of heat in such operations as soldering, brazing, case-hardening and tempering of metals is the development of two induction-type electronic power generators of 2 (Fig. 1) and 15 kw output by Engineering Products Department of Radio Corp. of America, Camden, N. J. Inductor coil may be seen in center of applicator unit on top of machine.

Both of the power generators are electron tube units designed for conversion of electrical power from the commercial 60-cycle supply to a frequency of approximately 400,000 cycles per second. Each generator is composed of two units, the main generator unit and an applicator unit. Housed in the main generator unit are the high voltage rectifier, main control and protective devices and most of the high frequency components. Applicator unit houses the output current transformer and its associated high-frequency elements. Fig. 4 shows interior of applicator unit of 2 kw unit. Primary of output transformer is the tank inductance of oscillator circuit, while secondary is a two-turn copper sheet with terminal arrangements for connecting two turns either in series or in parallel. Connected to the main generator by 25 ft cables, the applicator unit may be used in any desired position within the 25 ft radius.

In the 2 kw unit, the high frequency oscillator circuit employs two tubes

connected in parallel, operating in a self-exited Colpitts circuit, as shown in Fig. 2, which is a view of rear compartment of generator. The two tubes may be seen in the upper cabinet along with the r-f plate choke and grid blocking capacitors and, at right, the blower. Major units in lower portion of cabinet are rectifier plate transformer, power change transformer and filament voltage stabilizer assembly (left to right in photo).

High voltage rectifier uses four mercury vapor tubes connected for single-phase, full-wave operation. The larger 15 kw generator employs two air-cooled tubes in the high frequency section (connected in parallel and operating in a self-excited Hartly oscillator circuit) and six mercury vapor tubes connected for three-phase full-wave operation supplying the high voltage direct current (see Fig. 3).

Flexible coaxial cables connect the generator with the output circuit components, located in the work applicator units. This arrangement permits operation with low transmission line currents, minimizing line losses during operation.

Generators of this type are cooled by forced air circulation accomplished by drawing air through removable filters mounted in the rear of lower compartment, seen at lower left in Fig. 2. Final discharge of warm air is at rear and top of the cabinet. Air is used to cool the current transformer and water cools the work coils in the 2 kw model while all high frequency elements are cooled by tap water in the 15 kw model applicator unit. Water lines are electrically insulated from rest of unit by rubber hose connections.

Booklet Records War Activities of Lamson

War record of Lamson Corp., peacetime producers of pneumatic dispatch tubes and mechanical conveyors, is reviewed in recently published 33-page illustrated booklet entitled "The Lamson Record of Achievement in Engineering and Manufacturing of World War II". The Syracuse, N. Y. company turned out machine gun mounts, mine exploders, ammunition hoists for aircraft carriers, slat conveyors for Russian army, indoor target ranges for training aerial gunners, parachute flare fuzes.

Converts Inches to Decimals and Millimeters

New plastic circular instrument 5¾-in. in diameter was designed recently by American Hydromath Co., New York, to convert fractions of an inch into decimals and millimeters. Decimal equivalents are graduated in 0.001-in., and can be estimated to an accuracy better than 1/5000 of the range.

Metric equivalents are graduated in 0.1-mm with range from 0 to 100 mm. Graduations are reproduced on facing surfaces protested with a thin plastic lamination so that parallax error is eliminated, it is said. In addition, U. S. standard gage sizes from No. 3 through No. 30, and drill numbers from No. 1 through No. 60 are provided.

FLARELESS FITTING
for Joining Metal Tubing

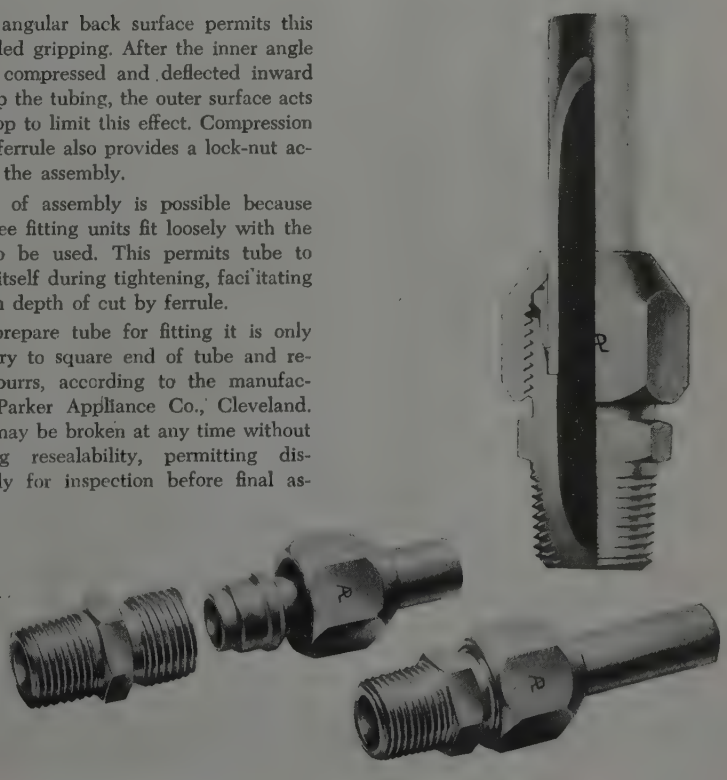
NEW method of joining all types of metal tubing, including ¼-in. stainless steel, in hydraulic and fluid conveying systems is said to provide a strong sealing grasp for the assemblies. It incorporates a steel ferrule which, when body and enclosing nut are tightened, acts to cut a shoulder in the tubing itself.

Referring to cut-away fitting, at right above, it can be seen that when the body and the nut are tightened, the confined ferrule is forced forward. The cone angle of the body connects the ferrule and directs its sharp forward edge downward, the resulting reduction of section of the ferrule permitting deflection of the extremity to afford good camming contact for the bite into the tube. Further tightening forces the ferrule into the tube, casting up a shoulder to resist pull-out when hydraulic pressure is applied to the system. The internal diameter of the tubing is affected but little by the compression of the ferrule.

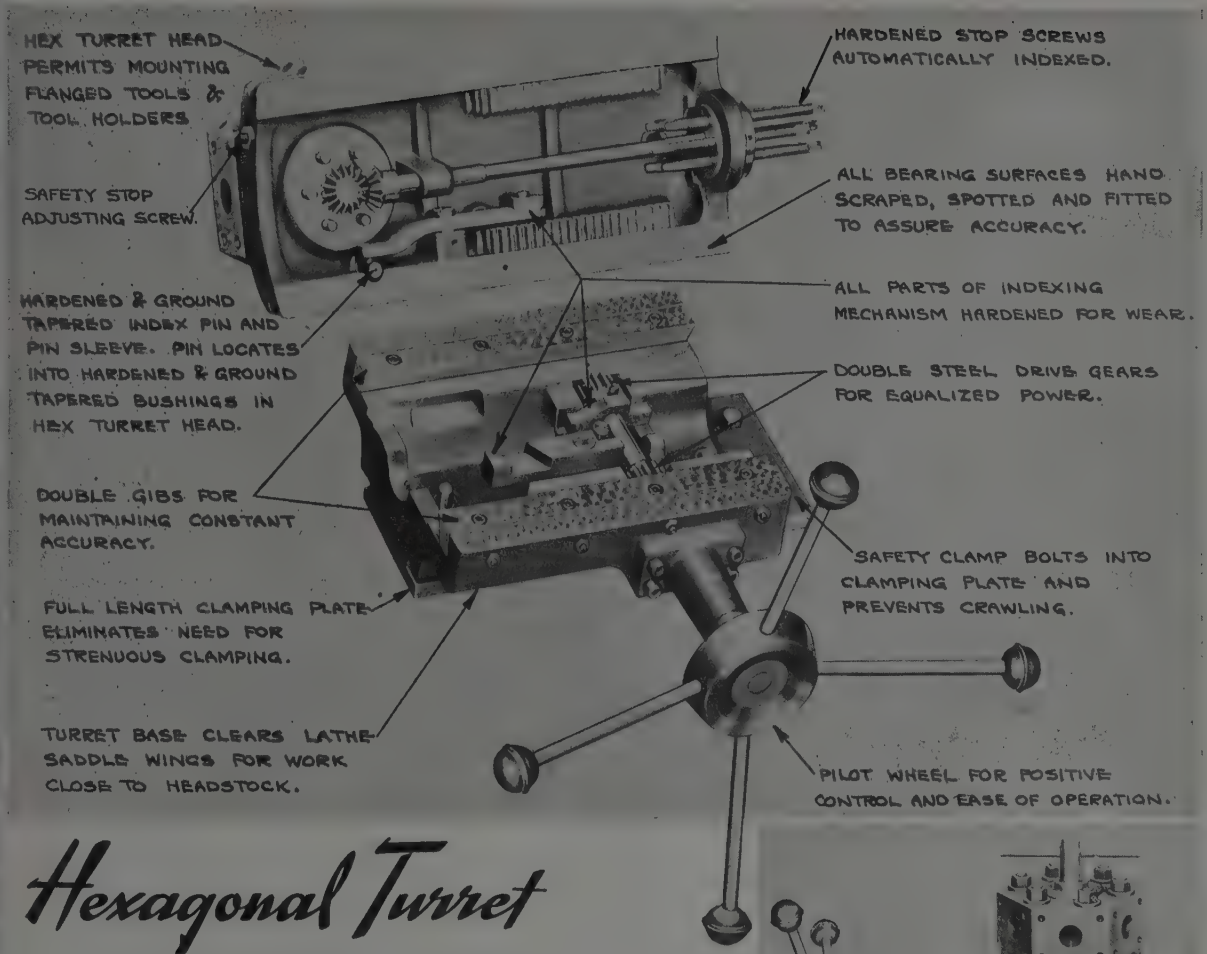
At the rear of the ferrule a second grip is being exerted for the dampening of possible vibration in the system. The mismatch angles between the ferrule and body produce this grip which serves to protect the front grip. A groove machined in the angular back surface permits this controlled gripping. After the inner angle is first compressed and deflected inward to grasp the tubing, the outer surface acts as a stop to limit this effect. Compression of the ferrule also provides a lock-nut action in the assembly.

Ease of assembly is possible because the three fitting units fit loosely with the tube to be used. This permits tube to center itself during tightening, facilitating uniform depth of cut by ferrule.

To prepare tube for fitting it is only necessary to square end of tube and remove burrs, according to the manufacturer, Parker Appliance Co., Cleveland. Joints may be broken at any time without affecting resealability, permitting disassembly for inspection before final assembly.



PAINTED FOR JONES & LAUGHLIN STEEL CORPORATION BY ORISON MACPHERSON


HEX TURRET HEAD PERMITS MOUNTING FLANGED TOOLS & TOOL HOLDERS
HARDENED STOP SCREWS AUTOMATICALLY INDEXED.
SAFETY STOP ADJUSTING SCREW.
ALL BEARING SURFACES HAND SCRAPED, SPOTTED AND FITTED TO ASSURE ACCURACY.
ALL PARTS OF INDEXING MECHANISM HARDENED FOR WEAR.
HARDENED & GROUND TAPERED INDEX PIN AND PIN SLEEVE. PIN LOCATES INTO HARDENED & GROUND TAPERED BUSHINGS IN HEX TURRET HEAD.
DOUBLE STEEL DRIVE GEARS FOR EQUALIZED POWER.
DOUBLE GIBS FOR MAINTAINING CONSTANT ACCURACY.
SAFETY CLAMP BOLTS INTO CLAMPING PLATE AND PREVENTS CRAWLING.
FULL LENGTH CLAMPING PLATE ELIMINATES NEED FOR STRENUOUS CLAMPING.
TURRET BASE CLEARS LATHE SADDLE WINGS FOR WORK CLOSE TO HEADSTOCK.
PILOT WHEEL FOR POSITIVE CONTROL AND EASE OF OPERATION.

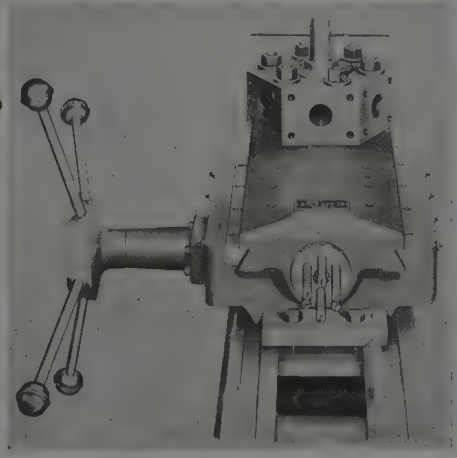
Hexagonal Turret

has increased versatility

INCREASED turret versatility is possible with the new hexagonal turret developed by Enco Mfg. Co., Chicago, which handles flanged tools and tool holders. Utilizing double steel drive gears and double racks for equalizing tool feed, it also has heavy duty gibs to maintain accuracy providing for an adjustment from either front or back dovetail.

All bearing surfaces are hand scraped, spotted and fitted to assure proper alignment and long usage. Hardened and ground tapered bushings, index pins and sleeve pins are said to assure precision indexing. Other features include clearance of lathe saddle wing for work close to headstock; a safety clamp to prevent crawling of turret and hardened stop screws.

Photo at top of page shows turret base with turret removed to show construction of base and indexing arrangement in turret. Illustration at right shows assembled unit as viewed from end of lathe.



GE To Exhibit Products At AISE Exposition

Operating demonstrations of a new control system for floor-operated cranes and a new mill motor will be conducted along with the exhibit of an auxiliary mill control panel utilizing new heavy duty direct current mill-type contactors at the Iron and Steel exposition exhibit of General Electric Co. in Cleveland Oct. 1 to 4.

Crane control consists of a small magnetic control panel mounted on crane and connected by a cable to pendant station suspended from crane. It provides for five-point, time-delay speed control. Armored mill motors are designed in ratings from 5 to 200 hp and feature increased horsepower in smaller space, at the same time retaining AISE ratings pertaining to horsepower, speed, temperature and mounting dimensions.

Nine contactors are included in the new line of mill-type contactors used on the auxiliary control panel, ranging in capacity from 100 to 2500 amp. All parts can be serviced and inspected from front of panel.

—o—

Bulletin No. 16 containing information which describes and illustrates machine adjustments that aid the operator in securing proper results from through-feed and in-feed centerless grinding is available gratis from Waltham Grinding Wheel Co., Waltham, Mass.

WELDING with an eye
OF HEAVY PRES

Up-to-date facilities and men trained to meet exacting standards of precision, make the fabricating and machining of large structure weldments standard production at Danly.

The mechanical press crown *left* brought no problem of size to Danly engineers and setup men. Sub-assembly construction permitted several crews to work on the components at the same time. This method cut much costly handling time—avoided inaccuracies in dimension and distortion which frequently occurs in welding of large structures.

Floor type boring mills *like the one shown at right* simplify exacting machine work. The horizontal indexing table makes it possible to machine each side of the press bed with but a few minutes to index the table and resume work on the next surface. The right-angle boring head *inset* makes possible complete internal milling and boring at any angle through 360 degrees.

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Welded and Machined
at Lower Final Cost

DANLY MACHIN

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ACHINING
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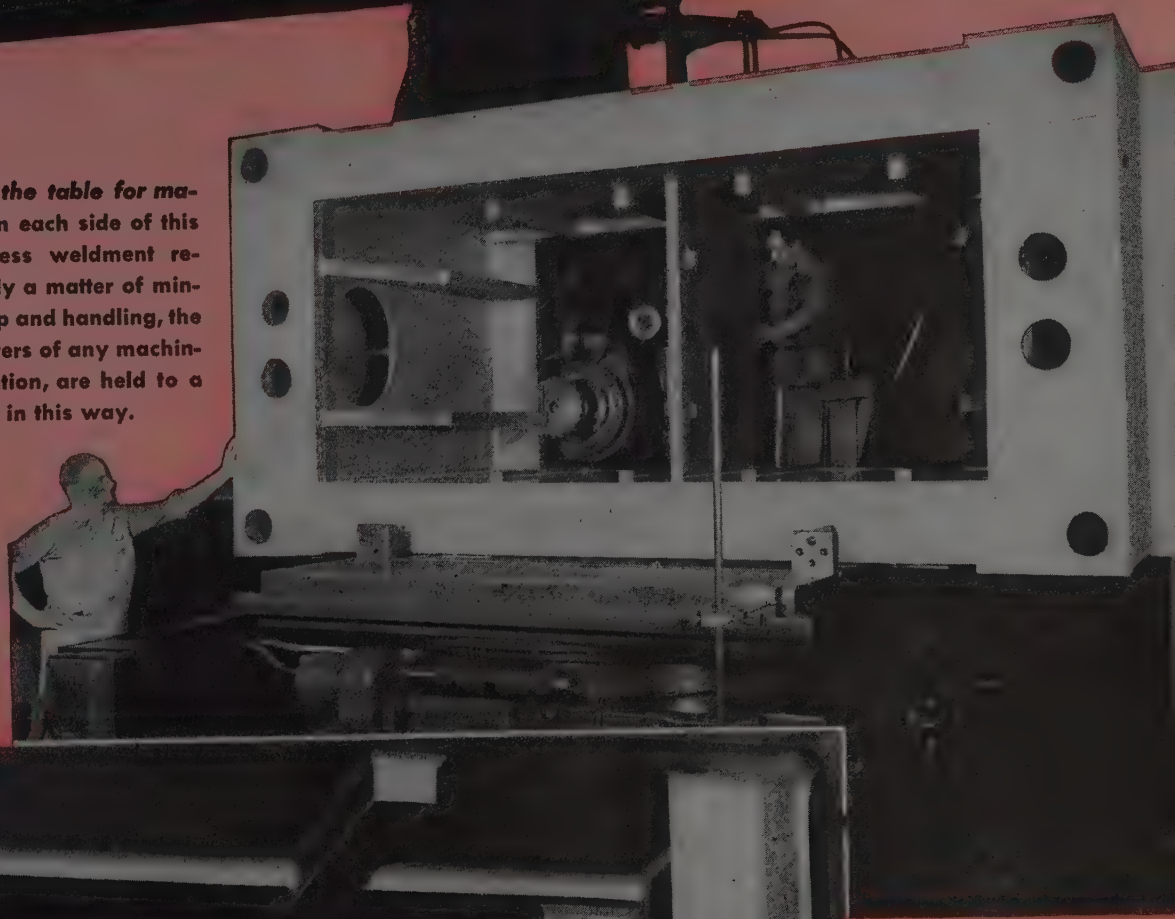
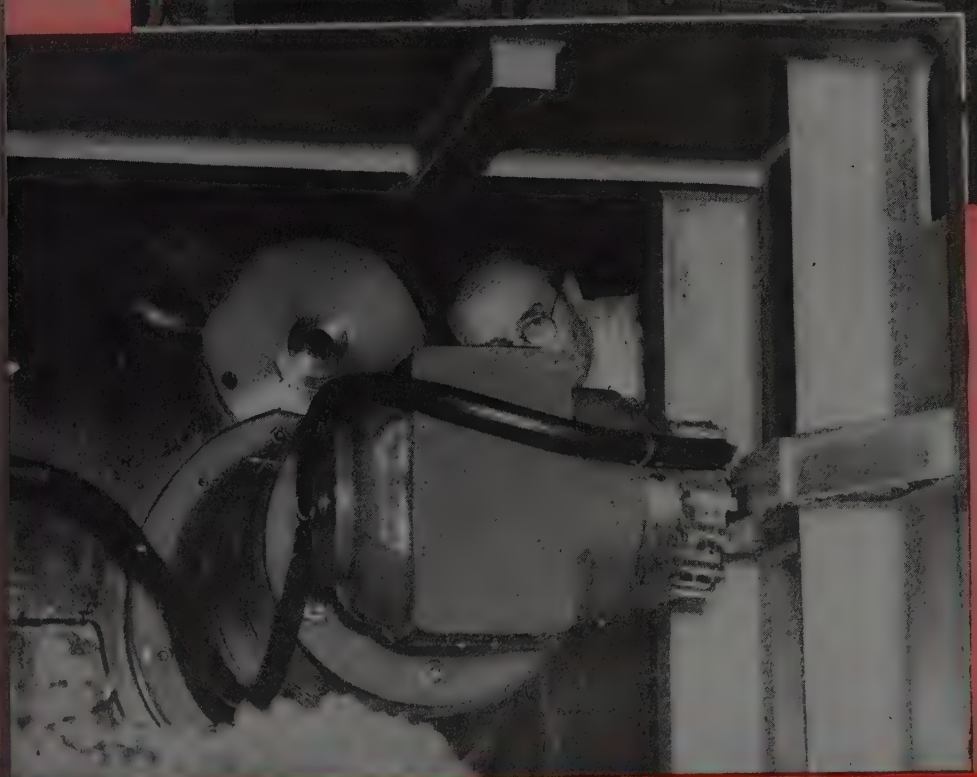


Indexing the table for machining on each side of this heavy press weldment requires only a matter of minutes. Setup and handling, the time wasters of any machining operation, are held to a minimum in this way.



This right-angle boring hea runs into deep wells and i teriors for machining on su faces like the side cushio guides on the press be *shown here.* Complete intern milling at any angle is poss ble in one setup.

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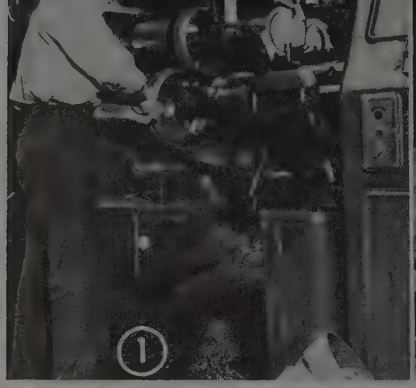

USE OF STEEL . . .

Marks Turning Point in Motor Design

War experience with steel is reflected in peacetime motor of increased shock resistance and ruggedness. Thirty-five per cent smaller than its predecessor, motor's starting torques are increase 134 per cent per pound

By F. C. RUSHING
Manager, Motor Engineering
Westinghouse Electric Corp.
Buffalo

USE of steel in new alternating-current motors in thicknesses equal to cast iron construction represents one of the latest important advances in motor design. Its use makes possible the production of a motor 35 per cent smaller in size than its predecessor, the required size being accomplished without sacrifice of electrical properties. Although the use of steel is not new, former practice in the application of steel for motors merely consisted of using thinner sections of steel than cast iron.

Shock resistance of steel is much greater than cast iron. This became evident during the war when use of cast iron on Navy vessels became taboo because of its low shock resistance. Steel motors had to be developed, and much experience was obtained in their use. Thus the war experience is reflected in a peacetime motor of marked increase in shock resistance and ruggedness. Starting torques are increased as much as 134 per cent per pound of motor, and maximum torques increased as much as 116 per cent per pound of motor.

It is a fallacy that steel corrodes faster than cast iron. Research tests demonstrate the two materials to corrode at equal rates. The explanation for the common belief lies in the fact that when cast iron is replaced by steel, the steel is usually of thinner section and will rust through sooner. Where thick steel sections are used, excessively rapid corrosion is not experienced.

The finish coating consists of base

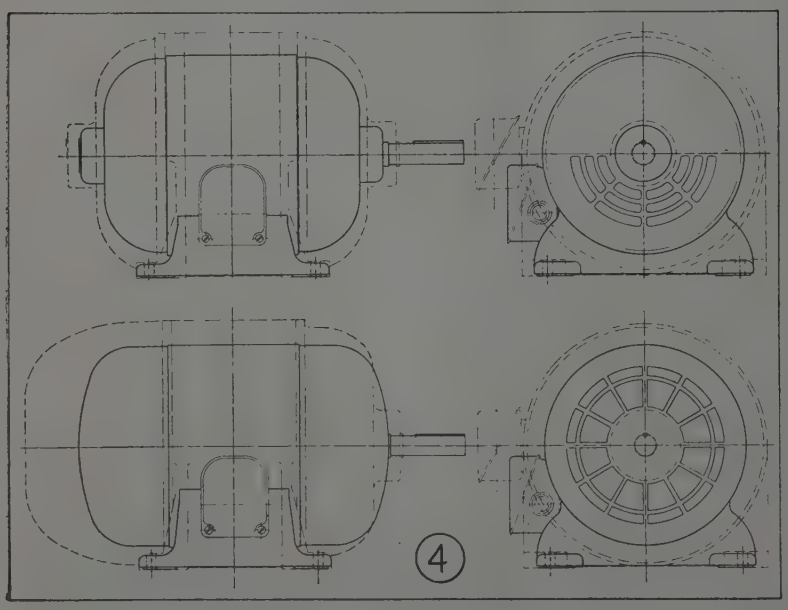

Fig. 1—Five machining operations on end bells of motor are done with one tooling operation in automatic chucking machine shown here

Fig. 2—Diameter of bearing bore in every end bell for motor is checked with an air gage. Allowable minimum to maximum variation is 0.0007-in.

Fig. 3—Placing coils in stator preparatory to sealing slot cell of motor. Seal is made with wooden wedge. Half-round groove in underside of wedge laps projecting edges of slot cell insulation together, insuring electrical and mechanical protection to synthetic resin insulated copper wire coils

Fig. 4—Comparative sizes of 7½-hp motors. New design, inside solid line, contrasted to last year's models shown by outside dotted line. Open protected type, top, requires 65 per cent as much space, while enclosed fan-cooled motor, bottom, requires but 56 per cent of former volume

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• Square D's line of oil-tight units is now available in surface mounting, oil-tight enclosures for 1, 2, 3, or 4 units. The features which have made these units the predominating choice for built-in applications, are just as valuable in these surface mounting enclosures.

- Proven oil-tight and coolant-tight by severe tests involving millions of operations.
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coats of baked thermoset varnish with a final coat of lacquer. Tests and experience demonstrated that steel with this finish is adequately corrosion resistant for general application. In some extremely severe applications, such as in chemical plants, stainless steel can be used for shields and hoods.

Improved appearance in surface smoothness also is made possible by use of steel. Much attention was given to the contour of this motor for applications such as machine tools, where the motors are in the open. Regular external shape and smooth surface contribute to its good appearance.

Use of steel also led to a smaller size. In motors, minimum clearances must be maintained between windings and grounded parts of the frame. Since dimensions of formed steel parts can be held more accurately than those in iron castings, allowances for large variation in cast iron do not have to be made. This may amount to a saving of ¼-in. on a 10-in. diameter or length.

Another factor that helped reduce size is an improved cooling system. Losses in a motor are inherent and are dissipated in form of heat. Temperature rise beyond a certain point is not allowable because of detrimental effects on electric insulation, and the heat must be carried away from the motor. Most of it is transferred to air blown over the hot surfaces. Much more air passes through the new motor than through its predecessor, permitting the reduction in size of the cooling surfaces while adequately maintaining temperature limits.

Comparative motor sizes of 7 1/2-hp ratings are shown in Fig. 4. The open-protected machine is 83 per cent as large in diameter and 94 per cent as long or a saving of 35 per cent of the volume of last year's machines. The new totally-enclosed motor is 83 per cent as large in diameter and 82 per cent as long, saving 44 per cent of the volume of its predecessor. (Standardized NEMA dimensions are maintained). These size reductions are accompanied by improvements in electrical and mechanical performance.

Smooth, quiet operation is accomplished by careful engineering and through precision manufacture. Noise and vibration are produced by harmonic forces acting on parts which distort in response to them. Proper choice of slot combinations and of winding distribution eliminated and reduced disturbing electrical harmonics.

Machining in One Set-Up

Precision manufacturing and quality control provide concentric air gaps which reduce the distortion due to remaining harmonic forces. Bracket-bearing bores and frame fits are machined in one set-up on a multiple-head machine shown in Fig. 1. Five machining operations on end bells are done with one tooling operation in this automatic chucking machine at the Buffalo plant of Westinghouse. First operation rough turns face and rabbet fit; second operation rough turns bearing bore and shaft bore; third operation semifinishes bearing bore and rabbet fit; fourth operation finishes face and rabbet fit; fifth operation finish turns rabbet fit and semifinishes shaft bore.

Bearing fits are later qualified and checked with a precision air gage, Fig. 2. Frame fits are concentrically machined relative to the punching bores in a double-end lathe, Fig. 8.

Mechanical harmonic forces produced by unbalance, are eliminated by dynamic balancing in a dynetric balancing machine, Fig. 9. Such balancing is not new on motors. But further improvement in mechanical balance is obtained in these motors through straighter shafts and improved bearing concentricity.

Completely proved prelubricated ball bearings, pioneered by Westinghouse, are used throughout the line of motors. They require lubrication no sooner than 5 years after the motor is placed in operation. During the last nine years, large numbers of prelubricated motors operated free of trouble under severe conditions. It is felt that 5 years without relubrication is con-

(*Please turn to Page* 117)

Fig. 5—Locating a crossover sleeve, one of new steps in procedure of winding coils of synthetic resin insulated copper wire

Fig. 6—Ability of motors to withstand abrasive dust is proved in this dust-tight chamber. Under test motors are driven at 1800 rpm for 8 hours out of each 24. Every 20 sec during the 24-hour period a 5 sec blast of air stirs abrasive composed of equal portions of 600, 400 and 250 mesh emery dust

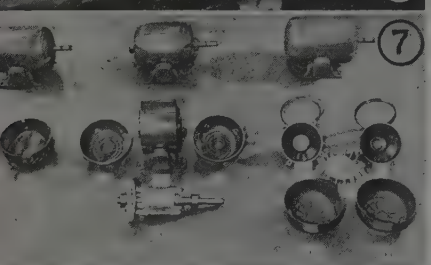

Fig. 7—Basic subassemblies and parts for three different motors produced

Fig. 8—Bracket fit and face on each end of frame and face on both end plates are machined all at one time in a double end lathe

Fig. 9—Cast rotor and blower here are dynetrically balanced. Operation assures motor as free from vibrations as possible

Fatigue Life of Bearings

(*Continued from Page 70*)

thousandths of an inch below the race surface.

Fig. 1 illustrates typical troostitic areas observed after running ball bearings under load. The micrographs were originally taken at a magnification of 1000 but are shown here somewhat reduced. They are actually composite pictures made by fitting together a series of separate photographs to show the structure of the material to a depth of about 0.020-in. below the raceway surface in four identical bearings run under identical operating conditions, and examined at 100, 200, 300, and 400 hours, respectively.

In these micrographs, as in all others shown, the surface of the raceway is at the top of the picture. The specimens from which these micrographs were made were obtained by cutting the bearings transverse to the race groove.

It is apparent that the scattered areas of troostite increase in size and fequency as the running time is increased. Note that the material in the immediate neighborhood of the point of contact, namely just below the surface, retains the unaltered structural characteristics of martensite, indicating that the action causing the development of the troostitic patches occurs some distance below the race surface. It has also been found that when the initially hardened structure was not completely martensitic but showed traces of troostite, the rate of formation of additional troostite patches, as shown by the dark areas below the contacting surface, materially increased, and endurance hours correspondingly declined.

There is apparently a close relationship between the density of the troostite patches and the operating conditions under which the bearing was run. For example, Figs. 4 and 5 show the growth of the troostite areas some distance below the surface of the raceway in two identical bearings run for approximately the same number of hours, but under different loads.

Fig. 2(a) shows the condition existing after 340 hours of operation under a radial load of 1800 lb, while Fig. 2(b) shows the condition existing after 380 hours of running under a radial load of 2200 lb. In Fig. 2(b), the troostitic patches are somewhat larger and darker than in Fig. 2(a), indicating the effect of increased load on structural change, all other conditions being equal.

In like manner, Fig. 2(c) shows the condition existing after 200 hours running under 2700 lb radial load, while Fig. 2(d) shows the existing condition after 220 hours of running under 3200 lb radial load. Here again the effect of increased load intensity is apparent in the density of troostite development.

The micrographs in Fig. 1 and 2 were obtained from examinations of standard ball bearings having conventional grooved raceways.

Bearing Performance Investigated

In order to investigate performance of bearings run under exceedingly high unit stresses, experimental bearings were made of SAE 52100 steel, heat treated according to standard ball bearing practice, in which the inner races were cylindrical surfaces rather than the conventional grooves. This resulted in the size of the pressure ellipses between the balls and the inner race being greatly reduced, as compared with those existing in conventional grooved raceways. A maximum compressive stress on the inner raceway of almost 800,000 psi was obtained by radial loads within the capacity of the test machines.

Fig. 4 includes micrographs taken transverse to the direction of the race groove at a magnification of 50, showing the formation of the troostitic areas in these bearings at running times of 66, 91, 207, and 312 hours, respectively. These micrographs, taken at low magnification, show more clearly the spread of the fatigue areas than those taken at a magnification of 1000, although the detail of the structure is not so apparent.

For comparative purposes, Fig. 3, taken at 1000 magnification, shows the structure in the center of the troostitic area of the bearing illustrated in Fig. 4(d). Here it is apparent that the same troostitic development noted in conventional bearings obtains in the case of these highly loaded specimens.

In Fig. 4 it is also apparent that the point of maximum troostite concentration is well below the race surface and that the material in the neighborhood of the race surface is apparently unaffected.

Fig. 6 illustrates the effect of load intensity on the depth of the troostitic area from the pressure surface. Fig. 6(a) shows the troostitic area in a heavily loaded long-lived bearing at a magnification of 15, the depth to the center of the dark area being approximately 0.008-in. Fig. 6(b) was taken at 1000 magnification and shows the condition existing in a lightly loaded bearing after many thousands of hours of running. Here the depth from the surface to the center of the troostitic area is approximately 0.0007-in.

As previously pointed out, the density of the troostitic patches is dependent upon the magnitude of load and the length of time the bearing is run at a given speed. Upon continued running, the concentration of troostite reaches a maximum, and the phenomenon shown in Fig. 9 becomes apparent.

Fig. 9(a) shows the structure at the point of maximum troostite concentra-

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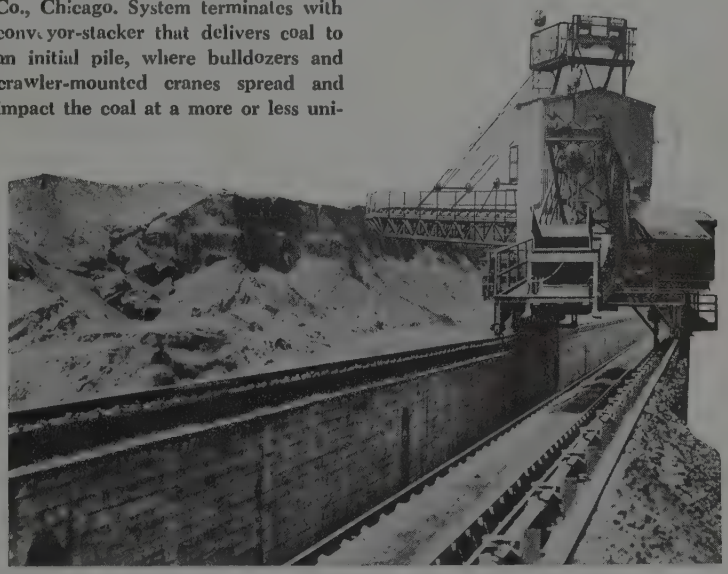

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tion in a bearing run under 1430 lb radial load for 9000 hours. Here the concentration of troostite is heavy, and in addition, horizontal gray lines have begun to appear in the micrograph. These are scattered through the troostitic zone. Likewise, Fig. 9(b) shows the condition existing in a similar bearing run under a radial load of 2208 lb for 1650 hours. Again the horizontal gray lines are apparent.

Both micrographs in Fig. 9 are taken transverse to the race groove at 1000 magnification. The gray lines shown are parallel to the raceway and are only found in exceedingly long-lived bearings. They seem to appear when the ultimate fatigue life is approached.

Sections Cut Transverse to Groove

All of the previously shown micrographs have been made from sections cut transverse to the race groove, as shown in Fig. 8.

If the bearing is cut along the bottom of the race groove parallel to the direction of rolling, the troostitic area apparent in the transverse sections becomes a circular band when viewed on a longitudinal cut, as shown in Fig. 10 which is a micrograph of a longitudinal section through a spalled failure.

Figs. 9 and 10, sections of the same bearing, show well-developed troostitic areas.

If a highly magnified micrograph is taken of the circular troostitic band apparent in the longitudinal view, the gray lines parallel to the race in Figs. 9(a) and (b) now show as criss-cross diagonal lines of similar character.

Figs. 11(a) and (b) are, respectively, a transverse and longitudinal section through the point of maximum troostite concentration in the same bearing, which was run for 4307 hours under a 3000-lb radial load.

In order to explain the gradual change from martensite to troostite, and the development of the gray lines noticed just before the ultimate fatigue life of the bearing is reached, it is necessary to understand the conditions of stress and strain existing in a ball bearing rotating under load. As a result of the research of Heinrich Hertz and subsequent investigators, the nature of the stresses resulting from the elastic contact of a ball and raceway under load are completely determinable, not only regarding the pressure surface itself, but also the material at points some distance from the pressure surface, within the contacting bodies themselves. Due to the stress distribution in, around, and below the pressure area, compressive stresses may be carried which are erroneous, compared to those commonly encountered in engineering work. As previously stated, the maximum compressive stress occurs at the center of the pressure area. In some conventional bearing applications it reaches values of 450,000 psi, and in special instances is as high as 750,000 psi.

Such high values of unit stress can be carried in ball bearings because in and around the pressure area stresses are set up which tend to reinforce the material and to limit displacement. As an illustration, imagine an elementary body compressed on all sides, as indicated in Fig. 13. If the compressions on all sides are equal, we have what approximates hydrostatic pressure. It is well known that solids can stand great hydrostatic pressures without damage. If the compressions on all sides are not equal, it is apparent that the material will suffer a distortion. The amount of this distortion will depend upon the differences in the forces acting on the sides rather than on their absolute magnitudes.

Creating Shear Stresses

Whenever this inequality of normal stresses exists at the sides of a particle, a shear stress is created on some plane oblique to the normal stresses, as illustrated in Fig. 14. In one plane the particle is subjected to a compression C vertically, and to a horizontal tension T. Across some oblique plane each of these stresses creates a shear the magnitude of which is equal to the projection of the normal stresses on that plane. If the material is weak in shear, there is a tendency for two oblique pieces to slide along each other when the normal stresses are applied.

If the normal stresses on all sides of the elementary particle are compressive and equal in magnitude, no shear can exist. If the compressive stresses are very nearly equal, very little shear stress is produced. It is this very nearly hydrostatic stress in the material surrounding the pressure area which enables the enormous stresses encountered in ball barings to be supported without damage.

Some idea of the distribution of tensile and compressive stresses below the pressure area in a ball bearing may be obtained from Fig. 16, which shows the stress distribution in a plane perpendicular to the axis of the bearing and passing through the center of the race groove. The minor axis of the pressure ellipse produced between ball and race groove is in this plane. Lines drawn in the section are lines of principal stresses, that is to say, where pure tension or compression exists. The kind of stress is indicated in the portions blocked by these lines.

The shaded block is chosen in line with the ball load; forces acting on it are heavily marked, for the sake of clearness. This particular particle is chosen at such a depth that it is acted upon by a heavy vertical compressive stress and a lesser horizontal compressive stress. Points at greater depth are subjected to vertical compression and horizontal tension, though the magnitudes of the tensile stresses are small.

A similar condition of stress exists in the plane of the major axis of the pressure ellipse.

In Fig. 15 variations in the vertical and horizontal principal stresses directly below the center of the pressure area are plotted as functions of the depth from the surface. Principal stresses Z, Y, and X acting on an elementary particle located at a distance below the pressure surface, bear the directional relationships to the major and minor axes of the pressure ellipse as indicated by the small isometric sketch in Fig. 15.

Plotting the principal stresses, we see that at the surface the vertical compression Z is a maximum. Surface stresses parallel respectively to the major and minor axes X and Y are lesser compressions; they decrease more rapidly as the distance from the surface becomes greater than does vertical compression Z. It is apparent that the maximum shear stress, which is equal to one-half the difference between any two principal stresses, is determined by the difference in the principal stresses lying in the plane of the minor axis of the pressure ellipse. The maximum shear stress thus determined is also plotted in Fig. 15.

Maximum Value of Stress

It is evident that the maximum value of shear stress occurs some distance below the pressure surface, and that at the point of maximum shear stress the principal stresses are all compressive.

Since the stress system is three-dimensional, a similar condition of shear stress exists in the plane of the major axis of the pressure ellipse, although the magnitude of the shear stress is less in this instance.

Fig. 12 shows approximately the lines of equal shear stress in a ball bearing race in the plane of the minor axis of the pressure ellipse. The maximum shear stress occurs inside the material at a depth approximately equal to one-third of the minor axis of the pressure ellipse from the surface. If the value of the maximum shear stress is regarded as unity, the approximate relative values of other shear stresses are shown by the contour lines.

We will now consider the forces which act at a point on a rotating inner race of a ball bearing under radial load. When

mounted in the laboratory test apparatus, the outer race of the bearing is stationary, and rotation of the inner race causes the balls to roll around the pitch circle at a speed slightly less than one-half of the speed of the rotating inner race. The portion of the bearing under load extends about 90 degrees either side of line of application of external radial load.

Obviously, a ball directly under the external radial load suffers the greatest compression, and hence is the most heavily loaded. As the ball is displaced either side of the load line, the compression is less, and the resulting load on the ball is less. Thus, a point on the rotating inner race, passing through the loaded zone, is subjected successively to increasing intensities of ball load as it approaches the line of action of the external load, and then to successively decreasing intensities of ball load. In other words, a point on the rotating inner race goes through a cycle of loading once every revolution, in which the point is repeatedly stressed by varying intensities of ball loads.

Considering now an elementary particle of the race material located some distance below the surface of the raceway, the effect of the successive applications of ball load is to produce repeated stressing of the particle, which in turn produces corresponding deformations of the particle.

Effect of Three-Dimensional Stress

As previously pointed out, the effect of the three-dimensional stress system acting on an elementary subsurface particle is to produce shearing stresses and strains. The energy required to produce these strains is stored in the material in the form of shear strain energy. Not all of this energy is recovered when the load producing the deformation is removed. Because of the internal friction of material, a certain amount of energy of deformation is transferred into heat.

Although each successive application of load is of a different magnitude, and hence a particle below the surface of the raceway is subjected to different magnitudes of stress at each load application, there is obviously some point beneath the surface of the raceway which, during the operating cycle of the bearing, has been subjected to the greatest amount of shear strain energy and hence to the greatest amount of heat.

At this point the temperatures produced will be the highest, and it is reasonable to expect the tempering of the hard martensitic structure will first occur here. Continued application of load, which is analogous to the production of further heat, will cause the area of tempering to spread, and since the ultimate strength of the material bears a definite relation to the hardness, and the hardness in turn is reduced by the continued application of heat, the effect of continued running is to reduce the hardness and strength of the material so that it can no longer support the stresses imposed.

Explanation of Gray Lines

The explantion of the gray lines produced in long-lived bearings when the ultimate fatigue life is approached lies in this theory. These lines are the result of plastic flow resulting from shear stresses above the reduced elastic limit of the troostitic material at the point of maximum heat generation. The gray color of the lines is due to a change in the structure of the material itself in the neighborhood of the plastic strains. The directions of the criss-cross lines noted in Fig. 11(b) coincide with the trajectories of shear strain obtained by Thomas and Hoersch at the University of Illinois in static tests of soft steel specimens loaded to the point of plastic flow and subsequently strain etched. Diagonal lines appear only in the longitudinal view because the critical shearing stresses lie in the plane of the minor axis of the pressure ellipse. Thus, the horizontal gray lines in Figs. 8(a), 9(b), and 11(a) are the traces of the trajectories of shearing slip on the transverse cutting plane.

Once plastic flow has started in the plane of the minor axis indicated by the appearance of the diagonal slip lines, continued running probably produces a shear failure on the planes of slippage. This subsurface shear failure is also reflected in a change in the distribution of stresses acting at the pressure surface. At the ends of the minor axis of the pressure ellipse fairly heavy tensile stresses are acting. These stresses are increased considerably by the subsurface shear failure, and it is believed that a tensile crack is produced at the end of the minor axis of the pressure ellipse under these conditions. This tensile crack grows downward into the material, finally meeting with the previously produced shearing slip, and a typical spall results.

Further evidence of the correctness of the shear strain energy theory lies in the fact that the location of the center of the troostitic patches coincides very closely with the point of maximum shear strain energy obtained by integration of the complete cycle of loading of the rotating inner race.

Because of the very definite agreement between the observed structural changes which occur in a ball bearing running under load and the operating conditions to which the bearing was subjected, a powerful tool is placed in the hands of bearing engineers. It is possible, by correct interpretation of metallographic observations, to estimate closely the load to which a particular bearing has been subjected and the length of time it has run, provided the operating speed is known. There are a great many bearing applications in which the loads are indeterminate. Interpretation of metallographic observations of bearings run in experimental models often indicates the need for changes in bearing specifications.

In addition to knowledge regarding the past history of a bearing run under load, metallographic examination also gives a definite indication of the remaining life expectancy, had running been continued. Since bearings under given operating conditions have initially only a definite amount of potential life, the fallacy of attempting to rejuvenate used bearings by regrinding is obvious. The regrinding procedure does not remove the material to a depth sufficient to eliminate completely the already partially fatigued area, namely, the troostitic development.

Tinplate Trucks; Spray Valves To Be Exhibited

A special 7000-lb capacity fork truck designed to handle double bundles of tinplate will be demonstrated along with three battery-powered hand trucks of standard pallet and platform models and a tinplate pallet model, at Iron and Steel exposition exhibit of Automatic Transportation Co., Chicago. Elmer F. Twyman and Roy L. Wolter, general manager and sales manager, respectively, will head a group of ten at the Exposition Oct. 1 to 4 in Cleveland.

In charge of the exhibit will be Robert M. Whitney of the company's advertising department. Other personnel who will be present are: J. M. Johnson and J. A. Baldinger, assistant sales managers; F. M. Liddle, special factory representative; Paul Scribner, service engineer (all of Chicago); E. H. Fairchild, southern sales manager, Birmingham, Ala.; and B. I. Florey, Cleveland and L. N. Crissman, Pittsburgh, sales representatives.

Shown for the first time will be Lever-Sealed plug valves and protected-seat hydraulic spray valves for descaling rolled and forged steel products at the booth of Homestead Valve Mfg. Co. of Coraopolis, Pa. Model JO Hypressure Jenny steam cleaner and the Adjusta-Blast gun also will be on exhibit along with straightway, 3-way and 4-way quarter-turn plug valves, hydraulic operating and Hovalco-Homestead boiler blow-off valves.

In attendance for Homestead will be D. H. Krey, general sales manager; E. G. Johnson, assistant general sales manager; B. F. Schuchman, vice president; A. J. Pugh and K. R. Lemmer, district sales manager.

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Hot Dip Galvanizing

(*Continued from Page* 78)

with some suitable substitute and continue the use of sal ammoniac? That is what was done when zinc chloride solutions were first employed and some dross reductions were secured. Sal ammoniac dissolved in water is unsuccessful because it speeds up the rusting of the iron and operates to deliver dirtier work to the zinc kettle. Zinc ammonium chloride dissolved in water is most effective, and, since ammonium chloride is one of its constituents, why not use it to replace the more volatile, less pleasant sal ammoniac on the zinc kettle also? This has become the most modern practice with gratifying results.

The successful use of zinc ammonium chloride both as a flux wash and a kettle flux requires a rather complete change in point of view regarding the purpose of a flux. No longer is it most important that it be a cleansing agent. The purpose of a flux is to serve as a deterrent to oxidization and as a solvent for any zinc oxide appearing in or on the molten zinc. The preparatory steps in hot galvanizing are: First, thorough pickling to secure adequately clean iron or steel object; second, thorough rinsing in cold running water to prevent any soluble iron salt or free acid from accompanying the rinsed work; and third, immersion of the work in a flux wash which provides a film capable of retarding oxidation until the work is immersed in the molten zinc. The film should not exert any direct chemical action on the iron or steel itself. This process is now being pursued on a large scale without increase in fluxing costs, with large savings in dross production and with simple handling, to the end that a higher quality of finished zinc coating is obtained.

Little consideration is given to the effect on dross production of relatively slight amounts of iron in solution in a flux wash. If the iron is in solution as ferrous chloride and the dilution is such that there is only 1 per cent of ferrous chloride present in the hydrochloric acid tank, then approximately 27 lb of such a hydrochloric acid will introduce 1 lb of iron in the zinc kettle to form dross from its original ferrous content alone. When it is remembered that additional ferrous chloride forms on the work as a result of its being exposed to the air before entering the zinc kettle it readily understood why dross reductio ranging from 40 to 50 per cent are n uncommon when care is taken to r medy this condition. Reductions a seldom less than 25 per cent and th lower figure may be a reflection of bett acid control in the old method or negl gence in the rinsing after pickling the new method.

Zinc ammonium chloride has a limit capacity to combine with iron and hold in solution. Iron enters a zinc ammoniu chloride solution by improper rinsing by some solution of iron in an oxid form. It has no sensible direct attac on iron or steel itself. If iron gets in the zinc ammonium chloride flux th solution soon takes on a yellow clay-lik appearance which serves as a visual si nal of carelessness at earlier stages the process. It is not good practice add free acid, either mineral or organi to such a contaminated flux wash b cause such acid additions will dissolve th iron sludge. While galvanizing can b continued yet the coating is not as sati factory as that applied when the sour of the iron is located and eliminate

Method of Fluxing Standard

The hydrochloric acid-sal ammoni method of fluxing is more or less stan ard. The hydrochloric acid bath vari in strength from 0.5 to 5 per cent a is used cold. Its length of service is d termined largely by the iron conte the bath generally being discarded wh it contains from 2 to 3 per cent. Ord narily, fresh hydrochloric acid is add to the existing bath as long as the ir content does not exceed this range. Fre acid is added when the bath does n seem to deliver bright clean wor Wherever the operation will permit wi safety to the workmen, the work, co and wet with the hydrochloric acid flu wash, is passed immediately to the s ammoniac flux fusion on the zinc directly into the molten zinc in som cases. This procedure always is accom panied with explosions when the col wet work comes in contact with the h zinc and has led to heating and dryin the work after it leaves the hydrochlo acid flux bath.

By the hydrochloric acid-sal ammoni method the work is covered with a wat film containing hydrochloric acid a ferrous chloride. Drying removes th moisture and some of the hydrochlo acid as a gas and leaves the iron chlori as the film. In either method of han ling, the actual hydrochloric acid pre ent in the film on the surface of the wo continues its attack on the iron to for more iron chlorides. Ferrous chlori on a given area of work increases least ten times over that present as dra

RAILWAY WELDER: This self-propelled welding outfit, capable of speeds up to 20 mph was designed by Hobart Bros. Co., Troy, O., for all railroad welding, particularly along the right of way. Welding generator is powered by gasoline engine from which power may be taken to operate heavy duty electric motor that drives rear wheels. Power is sufficient to tow work car with 8 or 10 men aboard

out from the hydrochloric acid tank on only a few minutes exposure before going into the zinc kettle.

Sal ammoniac used as a flux on the molten zinc is an effective cleansing agent and except for the annoyance and expense associated with its great volatility would be considered ideal for the purpose. Annoying fumes and short flux life are objectionable. No flux yet has been found that has the same rapid and effective cleansing quality as sal ammoniac. A different conception of the proper method and objective of these preparatory steps, however, soon rules sal ammoniac out of consideration as a flux. The objective of tighter, more ductile zinc coats apparently can be reached economically by the complete replacement of the hydrochloric acid-sal ammoniac step and this end is realized by the use of the proper zinc ammonium chloride, both as a flux wash to replace hydrochloric acid and as a solid material for fusion on the zinc, replacing the sal ammoniac.

Obtaining Ductile Zinc Coats

It has been demonstrated repeatedly on all types of galvanizing operations that the tightest, most ductile zinc coats are obtained when the alloying of the zinc to the iron takes place under circumstances where no oxides, sulphates or chlorides of iron must be disposed of in or on the zinc kettle. Obviously galvanizing under such conditions means lower dross production and yields savings which more than offset any apparent expenses involved in securing the previously mentioned conditions.

Many of the probable reactions of the chemicals and observations of flux effectiveness are described by Bablik[5]. Ammonium chloride volatilizes on heating and dissociates but does not melt. This dissociation beings about 280° C (536° F) and is complete at 350° C (662° F) and means that the ammonium chloride breaks up into its gaseous constituents.

$$NH_4Cl + Heat = NH_3 + HCl$$

As the gases cool, they recombine to again become ammonium chloride. Also, the hydrochloric acid (HCl) gas may attack the molten zinc to form zinc chloride, or any oxide to form the chloride of its metal. To some extent therefore, it is possible for free ammonia (NH_3) gas to escape in the air or enter into combination with the zinc chloride, or other metallic chloride, to form complexes of the general formula $ZnCl_2$ (NH_3) x.

Placing ammonium chloride crystals on molten zinc causes an immediate copious evolution of white fumes, which are the volatilized salt. At first some small globules of clear watery fusion appear, which can be built up to a stable fusion after several additions of ammonium chloride. This fresh fusion consists largely of zinc chloride and might be considered as a matrix, after a fashion, from which the flux grows. Placing zinc ammonium chloride crystals on molten zinc acts similarly, except that there is less white fume formed and a quiet fusion of similar nature appears at once. It would seem as if the resulting fused mass, made by placing ammonium chloride and zinc ammonium chloride crystals on molten zinc, is similar if not identical in composition. The fusions consist initially of zinc chloride, zinc chloride ammonia, $ZnCl_2$ (NH_3) x,

TABLE II
ANALYSIS OF SAL AMMONIAC SKIMMINGS

Element	Per Cent
Insoluble in acid (HCl)	0.88
Soluble in water	55.57
Ammonia (NH_3)	5.37
Zinc (Zn)	49.92
Chlorine (Cl)	34.26

zinc ammonium chloride and ammonium chloride. To a small extent, and not necessarily permanently, fused material contains chlorides of iron, lead, cadmium and other impurities. Likewise zinc oxide occurring on the molten zinc is converted to zinc chloride, or to a basic zinc chloride. Water from the entering work, or from chemical reaction, also provides oxygen to produce basic zinc chloride (zinc oxychloride).

Typical spent fluxes (sal ammoniac skimmings) from plants galvanizing sheet steel or housewares are approximately of the same analysis as shown in Table II. Similar wastes known to have been produced by using ammonium chloride as a flux, frequently contain as high as 7 per cent ammonia. Wastes from similar galvanizing operations, known to have been produced by the use of zinc ammonium chloride, generally contain about 3 per cent ammonia and seldom reach as high a content as 5 per cent ammonia (NH_3).

The black, pasty mass floating on the molten zinc at the place where the objects to be galvanized enter the zinc kettle, is the flux in its fused state. This is the point where it must perform its most important work, so that it must exist as long as possible in an active, effective condition.

What the nature of this black fused mass is, how it is formed, how it works, why it fails and when it is spent, are matters of conjecture rather than of exact knowledge. The steadily changing conditions of operation in the tempering range of 800 to 890° F make difficult the dependable sampling of the fused material for analytical study. Producing this fused material on a laboratory scale is not sufficient because it would not include the effects which arise as a result of the constant passage of objects to be galvanized through the flux fusion existing on the bath surface of a working zinc kettle.

When the fused mass of flux flows unconfined about the surface of the zinc, the spent flux from the galvanizing operation becomes mixed with quantities of zinc oxide in excess of the chemical ability of the flux to absorb. Consequently, analysis of such flux wastes cannot throw any light on the chemistry of the flux fusion, or help in determining any analytical procedure for measuring flux usefulness. Analytical methods do not offer sufficiently rapid, simple and accurately-obtained information to make them a practical means of controlling the fluxing efficiency. Visual observations appear at present as the only available method of control.

The zinc content of the spent flux need not necessarily be obtained entirely from the molten zinc. When ammonium chloride is the volatile flux material, the zinc found in the waste skimmings comes from the molten zinc. Zinc ammonium chloride, which theoretically contains 22.04 per cent zinc, contributes a large part of the zinc content of the spent flux and to that extent introduces an added economy in galvanizing.

(*To be continued*)

[5] A Study of Fluxing in Galvanizing, by Dr. Heinz Bablik, *Metal Industry*, vol. 25, June 1924. Also Galvanizing, ibid, Chap. II, published by E. & F. N. Spon, Ltd., London.

Use of Bronze Welding

(*Concluded from Page* 82)

of the finished part were within necessary tolerances for any final machining that might have been necessary. The draw bench cylinder is hydraulically controlled for forming hot forgings through male and female forming dies.

Shortly after the first cylinder was repaired, a second cracked in service. This job was handled in the same manner, with preparation time being about the same and welding taking 16 hours. Machine was out of service for six days, compared with an estimated six to eight-week wait for delivery of a new cylinder.

Booklet Lists Steel Uses

A booklet on the properties and uses of high nickel alloy steels organized to aid the engineer in his selection of the proper alloys from the types available is offered by Carpenter Steel Co., Reading, Pa. It includes a diagram showing the three fundamental effects upon which applications are based—temperature permeability, expansion and magnetic permeability. Table shows properties for entire range of nickel content.

Industrial Equipment

Car Puller

Silent Hoist & Crane Co., Brooklyn 20, N. Y., is offering a new model electric capstan car puller in which the gearing is integral with motor. It is totally enclosed, making the unit dirtproof, waterproof, and ideal for out-of-door use in all weather. Enclosed worm-gear reduction runs in a continual bath of oil.

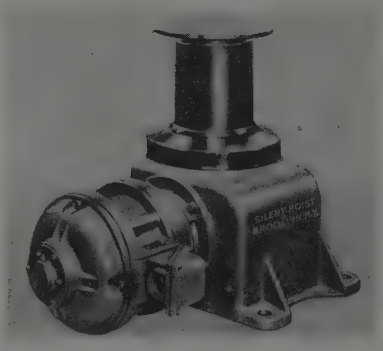
Puller, right, is made in two sizes, a 7½ unit with a capacity of 5000 lb draw-bar pull and a 15 lb unit with 10,000 lb draw-bar pulling capacity. Stock units are available for 220/440 v, 3-phase, 60 cycles, and also for direct current service.

Steel 9/30/46; *Item No.* 9647

Strapping Device

Signode Steel Strapping Co., 2600 North Western avenue, Chicago 47, announces a new A-2 seal feed strapping machine for production strapping on conveyor or centralized shipping system. This semiautomatic one-piece strapping tool tensions cuts and seals in three continuous operations. It is offered for use with 3/8 x 0.015-in., 3/8 x 0.020-in., 1/2 x 0.015-in., 1/2 x 0.020-in. strap.

When used with tool mount (as shown



upper right) the machine represents an extra-fast operating procedure. When the strapping operation is completed the tool mount raises the strapping machine from the package or box.

Steel 9/30/46; *Item No.* 9658

Hydraulic Motor

Production of a 47-hp industrial hydraulic motor, combining high starting torque with turbine-smooth power is announced by Superdraulic Corp., Dearborn Mich. Called Triport, motor right below, is only 10½-in. in diameter and light enough to be easily handled by one man. Torque range is as high as 200 lb ft. Motor is available in two types, one

rated at 26½ gpm with 3500 psi, input at 1200 rpm, the other at 19 gpm with 5000 psi at 1200 rpm.

Steel 9/30/46; *Item No.* 9652

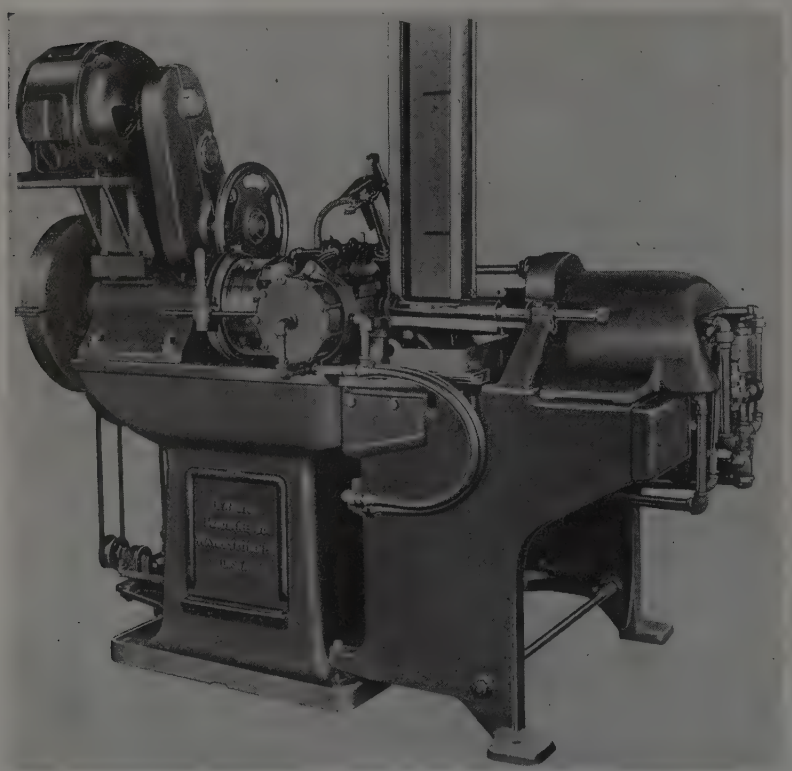
Nipple Machine

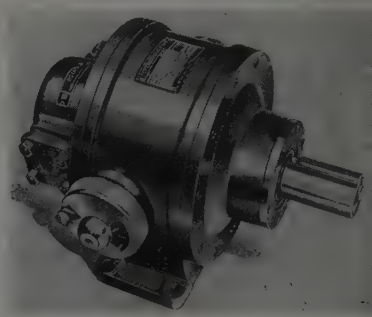
Nipple machine, left below, developed by Landis Machine Co., Waynesboro, Pa. threads, reams, and chamfers both ends of space ripples automatically. Machine is built in two sizes; the 1¼-in. machine for ½, ¾, or 1 in. pipe sizes and the 2-in. machine for 1, 1¼, 1½, or 2-in. pipe sizes.

Machines include two spindles, each equipped with internal trip semireceding pipe and nipple threading die head and reaming attachments. Their two carriages have air-operated vises for gripping nipples. Left hand carriage carries an adjustable magazine from which nipple blanks are fed automatically into the machine.

In operation, nipple blanks, cut to desired length, are placed in magazine where they are fed into machine, one for each cycle. After being released from magazine, nipple is pushed into position in grips following which air vise closes to hold blank in position and against turning. Left hand carriage then advances rapidly to the thread starting position and then assumes a feed rate of travel to produce required thread lead.

After required length of thread is cut and chamfering, and reaming operation is completed, cam-controlled air-operated





(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 116.)

How an Inexpensive System SAVES $8,000 A YEAR

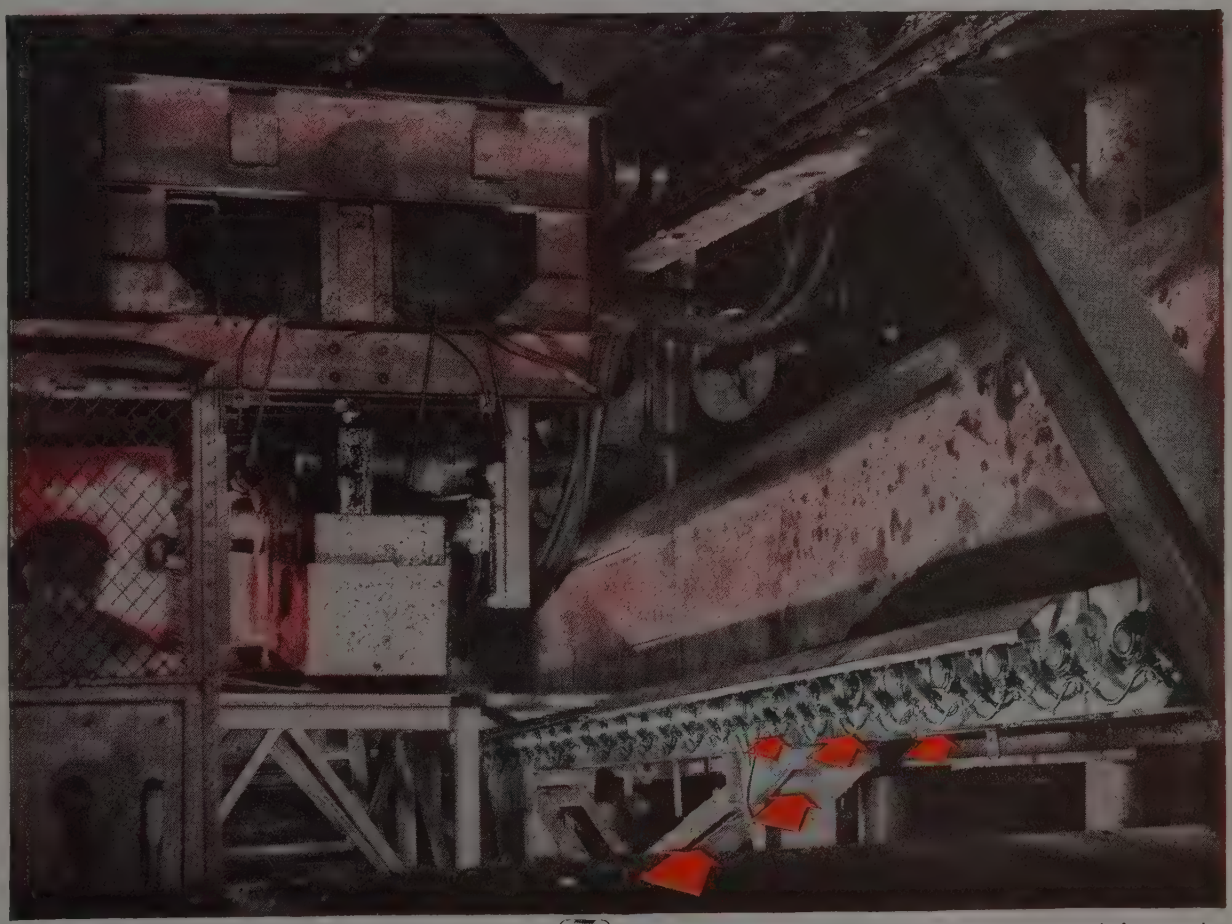
GLOBE Steel Tubes Co., Milwaukee, Wisconsin, considered to be the most modern manufacturer of seamless steel tubing, has hundreds of heavy machines literally loaded with thousands of bearings. These bearings function at high speed under terrific heat, and many were inaccessible or could not be lubricated while machines were running.

To meet this problem, Globe installed Alemite Centralized Systems. Today, all machines equipped with these Systems operate 3 shifts and *never* shut down for lubrication!

The result — Globe estimates over-all savings in lubrication costs this year will total $8,000 . . . through elimination of bearing failures, overtime pay for lubrication, and downtime on machine production. No wonder management has set up a program of installing Alemite Systems *exclusively* on present machines as well as on new machines to come.

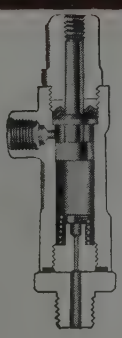
Your lubrication problem may be similar to Globe's. Or you may have other conditions — such as excessive dust, dirt, or moisture, operational hazards, human error, need for cleanliness, bearings overlooked — that are running up costs. In any case, you'll be interested in what Alemite Systems can do for you.

There are 4 Alemite Systems, each adaptable to almost every type of machine. Have an Alemite Lubrication Specialist demonstrate one or all 4 Systems right at your desk with transparent working models. Write Alemite, 1879 Diversey Parkway, Chicago 14, Illinois.



The huge rotary hearth furnace, and the hot conveyor at right foreground, are lubricated with Alemite LubroMeter Centralized Systems. Hundreds of machines in the Globe plant are also LubroMeter equipped.

Here's What Makes an Alemite Centralized Lubrication System "Tick"



This is a cutaway view of an Alemite LubroMeter feeder valve. It may be mounted directly in the bearing and handles grease or oil. To lubricate a machine, *even while it is in operation,* lubricant is introduced at a central point and forced through metal "arteries" to the feeder valves. These valves discharge a measured amount of lubricant to every bearing in the system. An indicator on each valve signals when the bearing is correctly lubricated. The over-all savings can enable you to amortize an Alemite Centralized System in as little as 3 months.

ALEMITE HELPS THE WORLD GO 'ROUND

Another Product of STEWART WARNER

ALEMITE

Centralized Lubrication Systems

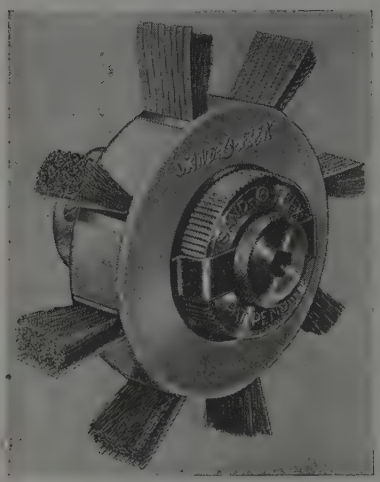
transfer mechanism removes semifinished blank and places it in loading position for right hand carriage, turning nipple end for end as it moves into position. Nipple then is pushed into position where it is gripped to be reamed, chamfered, and threaded in same manner as first end was on left hand carriage. After completion of the second threaded end, nipple is discharged.

Steel 9/30/46; *Item No.* 9637

Sanding Wheel

Sand-O-Flex Corp., Los Angeles, announces addition to its line of abrasive tools of a brush-backed sanding wheel to be identified as Sand-O-Flex Model 350-B. Wheel is 3⅝-in. in diameter (5½-in. including brushes) and weighs 1⅞-lb.

Eight replaceable brushes "cushion" the abrasive strip allowing the flexibility



necessary for finishing irregular surfaces. Wheel can be used effectively on any electric motor shaft; a 1/6-hp motor or a ¼-in. capacity electric hand drill is adequate, most satisfactory speed ranges being from 400 to 1750 rpm.

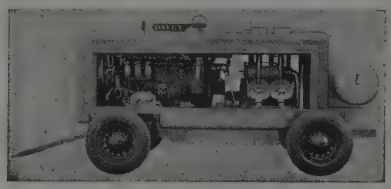
Easily manipulated on portable tools or on flexible shafts, the wheel will slide easily over and into any recess or contoured surface. It can be loaded with a wide variety of grits.

Steel 9/30/46; *Item No.* 9595

Air Compressors

Production of 315-W (gasoline-powered) and 315 WD (diesel-powered) air compressors capable of producing 315 cu ft of free air per minute at 100 lb pressure is announced by Davey Compressor Co., Kent, O. Available in standard skid, steel wheel trailer, and pneumatic-tired trailer mounting styles, and flanged wheel types for railroad work, compressors consist of two banks of three cylinders, each bank being arranged in W form.

Gasoline-driven units have an overall length of 140 in. while diesel ma-



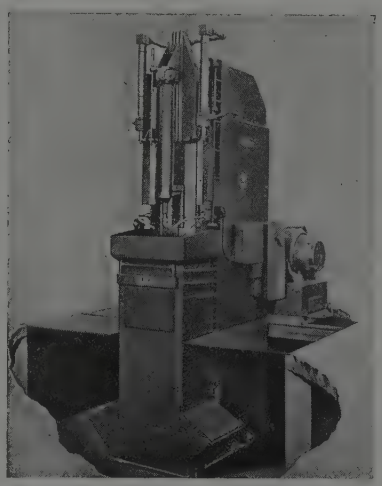
chines are 12 in. longer. Standard gas units are currently equipped with Hercules RXLD engines, and diesels employ International UD-18 power plants.

Compressors' four low-pressure cylinders are fitted with individual air cleaners to provide cooling of cylinders and heads during idling periods.

Steel 9/30/46; *Item No.* 9735

Broaching Machine

Thirty-three internal involute splines are finish broached in 8½-in. diameter steel clutch driving ring plates in a single pass on Oilgear type XP 30 x 54-in. stroke vertical pull-down broaching machine. Machine was designed and built



by Oilgear Co., Milwaukee 4, and tool was made by Continental Tool Works Division, Ex-Cell-O Corp., Detroit.

In operation, a clutch plate is placed on machine table. As upper tool handling carriage descends, tool shank accurately centralizes clutch plate and enters automatic puller on main pulling slide. Approximately 0.530-in. stock is removed on ID at a production of 120 plates per hour. A small slab tool mounted on the main slide finish broaches external mounting surfaces on 200 lever brackets per hour.

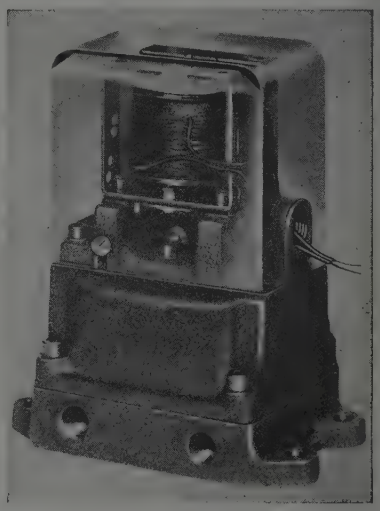
Two-way variable delivery pump transmits fluid power to tool pulling slide. Cutting speed is variable up to 30 fpm. All tool handling carriage and tool pulling slide movements are fully interlocked and synchronized. Both stroke and position of tool slide can be adjusted to suit broaching operation.

Steel 9/30/46; *Item No.* 9737

Solenoid Valve

Another series of 4-way solenoid-controlled and 5-port valves developed recently by Numatics, Milford, Mich., can be mounted in any position by using either side or bottom pipe connection.

Two poppet elements, without springs, alternately open and close to pressure and exhaust by "fluid lever" air from a solenoid-operated central distributor. Poppet elements control respective ends of a double-acting air cylinder, with either



single or dual pressure. Seat ports and air passages are larger than inside of standard pipe.

Any working pressure from 0 to 150 psi is handled with efficiency. One size, low amperage, solenoid with 5/64-in. travel is used for all pipe sizes. Known as SR-4 series, these valves are available in the following pipe sizes: ¼, ⅜, ½, and ¾-in. upon request.

Steel 9/30/46; *Item No.* 9627

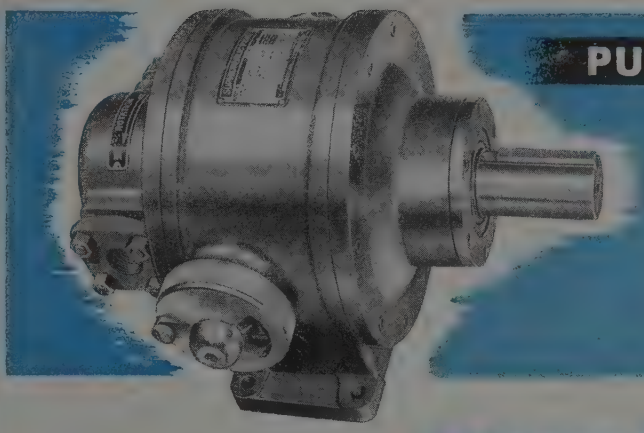
Electric Hoist

Line of Midget King electric hoists manufactured by Yale & Towne Mfg. Co., 4530 Tacony street, Philadelphia 24, was expanded recently to include a 2-ton model. Light in weight, yet producing fast lifting power, the hoist derives its power from a 1 hp motor. Lifting and lowering action is obtained by a one-hand bar-grip control, leaving operator

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 116.)

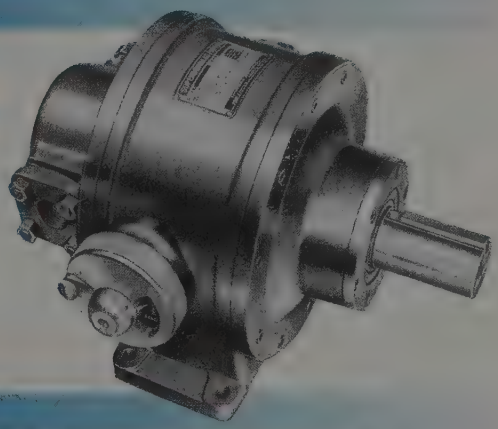
Every One a Star!

Superdraulic pumps, motors, transmissions, relief valves, check valves, 4-way valves, power units, and high-pressure couplings enable you to utilize hydraulics at its best. Following are descriptions of principal Superdraulic units:



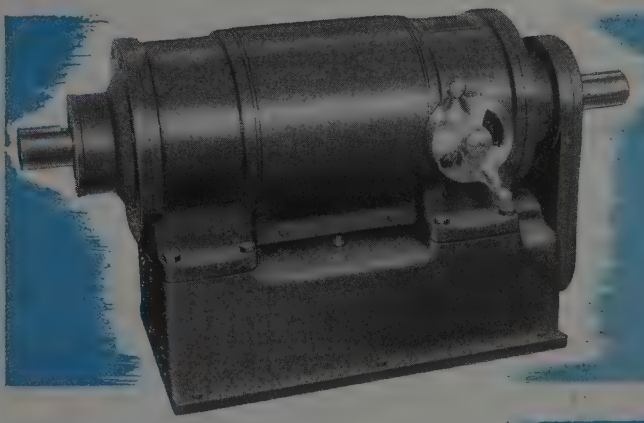
PUMPS

High-pressure hydraulic pumps—5000 psi, 40 hp with 0 to 12 gpm at 1200 rpm or 0 to 17 gpm at 3500 psi. Here is giant power in a midget hydraulic pump only 10½″ in diameter. Instantly responsive finger volume control gives variable volume and reversible flow. Also available in constant delivery types only 9″ in diameter with identical rating. Ideal power for presses, plastics machinery—wherever hydraulic power is required and where space is at a premium.



MOTORS

Triport hydraulic motors—26½ gpm at 3500 psi input at 1200 rpm, 19 gpm at 5000 psi input at 1200 rpm. Giant horsepower and giant torque in hydraulic motors of midget size. Sixty-six power strokes per revolution provide high starting torque and turbine-smooth output. Up to 47 hp with torque range up to 200 lbs. ft. in either type. Ideal for driving all types of machinery.



TRANSMISSIONS

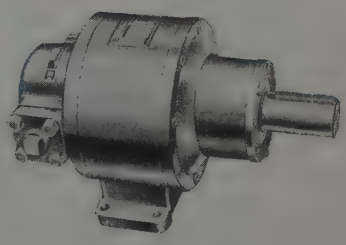
Million-speed hydraulic transmissions. Combining the famous Superdraulic variable delivery pump and triport motor, these units provide infinitely variable, turbine-smooth power in minimum space. Up to 200 lbs. ft. output torque, 0 to 1200 rpm (reversible), up to 30 hp output. A perfect transmission for countless industrial applications.

t is almost certain that in their long experience, Super-draulic engineers have been called upon to solve hydraulics problems similar to yours. They would welcome an opportunity to sit down with you and discuss the application of hydraulic power to your products.

In the meantime, send for complete technical descrip-tions of the above Superdraulic units.

JUNIOR PUMPS

The Superdraulic Junior Pump, as its name implies, is practically a duplicate of the 40 hp Superdraulic constant delivery pump on a reduced scale. A single bank of eleven plungers delivers 3 gpm at 1800 rpm and 2 gpm at 1200 rpm. This pump is furnished for 5000 psi continuous duty operation.



Superdraulic Corporation

HYDRAULIC PUMPS • MOTORS • TRANSMISSIONS • VALVES

MILLER AT FORD ROAD • DEARBORN, MICHIGAN

thermal assembly which can be adjusted by either knob and pointer with calibrated dial, or by screw driver. Calibrated adjustments cover any 120 or 250° F in range from —120 to 600° F. Screw driver adjustments cover entire ranges from —120 to 180° F, from 50 to 350° F, or from 50 to 600° F.

Steel 9/30/46; *Item No.* 9569

Dielectric Heater

A new electronic heater for dielectric heating of plastic preforms is offered by Industrial Heating Division of General Electric Co., Schenectady, N. Y. It is designed for operation at 40 megacycles. A water-cooled oscillator tube in the heater makes possible use of an average full-

power 5 kw output during entire heating cycle.

After plastic preforms are placed on electrode of oven-like preheater and cover is closed, preheat cycle is started by means of a pushbutton station, the rest of operation being entirely automatic.

Steel 9/30/46; *Item No.* 9529

Thermometer

An industrial thermometer, announced by W. C. Dillon & Co. Inc., 5410 West Harrison street, Chicago 44, is resistant to all but a few acids and is accurate within 1 per cent over its entire scale. Its pointer is fixed to an 18-8 stainless steel shaft, and shaft directly to a coil.

The ¼-in. diameter shaft also is offered in lengths of 5 and 9 in. Dials are 3 and 5 in. in diameter and are of anodized aluminum, with crystal or Lucite cover over the pointer and dial face. Accuracy of instrument is unaffected up to 50 per cent above 500° F range and up to 10 per cent above 750° F range.

Steel 9/30/46; *Item No.* 9563

Chain Conveying System

Cans and other types of containers are handled by a new Styl-O-Matic conveying system recently developed by Island Equipment Corp., 101 Park ave-

nue, New York 17. To save space its power unit is hung from return track.

Return chain belt of the system rides on track, eliminating sag and vibration. The flat, smooth top steel chain is like a continuous flat top table, every link fitting and operating as though a solid belt.

Conveyor is electrically driven. Its links can be quickly and easily adjusted, removed or replaced.

Steel 9/30/46; *Item No.* 9581

Coil Winder Drive

Ideal Industries Inc. 1921 Park avenue, Sycamore, Ill., announces a new coil winder drive, especially designed for fractional horsepower motor winding. Operation has been simplified to only two controls and a clutch in obtaining a speed variation of 41 to 410 rpm. Turns are recorded by an Odometer type counter which is in full view of operator.

Driven by a ½-hp, 1750 rpm motor through a spur gear drive, maximum torque or pulling power is delivered to winding head. Machined spur gears assure smooth, quiet operation without "back lash" or starting lag. Torque is 77 in.-lb at fast speed and 770 in.-lb at slow speed.

Steel 9/30/46; *Item No.* 9608

Resistance Meter

A portable, self-contained insulation resistance meter testing to 50,000 megohms is announced by Associated Research Inc., 231 South Green street, Chicago 7. The unit, model 261 Vibrotest, has a high voltage regulator in measuring circuit. It is equipped with charging circuit to facilitate faster testing of condensers or capacity circuits.

Instrument has its own power supply —two No. 6, 1½-volt dry cells providing ample power of 500 volts. Meter will operate under extremes in temperature from —40 to 140° F.

Steel 9/30/46; *Item No.* 9557

All-Rubber Wheel

An all-rubber industrial wheel is announced by B. F. Goodrich Co., Akron, O., for use in plants where corrosive agents are encountered. Wheel is constructed with a metal bearing sleeve molded integrally in a hard rubber core in which ball bearings for a choice of axle diameters are mounted.

Carrying capacity ratings for all-rubber wheels are equal to other types of wheels of same size, but resistance to extreme impact loads is less.

Steel 9/30/46; *Item No.* 9547

Spot Welder

Bench type spot welder developed by Thomson Electric Welder Co., Lynn, Mass., is designed for rapid resistance welding of small parts. Model A-11 bench type spot welder shown is driven by a ¼-hp motor geared to a worm reduction

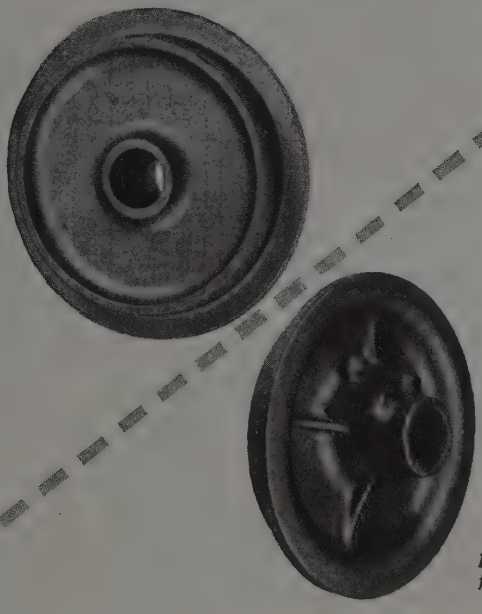
unit which turns a cam shaft through a one revolution clutch. Operation is initiated through a solenoid clutch pull controlled by a foot push-button switch.

Two transformer capacities are avail-

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 116.)

One purpose...

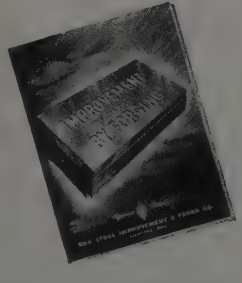
the IMPROVEMENT of Metals



Forged upper wheel for crawler-type track

BY FORGING

In the battle for lower costs, the correct relationship of quality and cost for a part can be obtained and maintained by forging it. Forging steels and other metals in closed impression dies *develops maximum metal quality by controlling, directioning, and concentrating grain structure* to meet stresses, shocks and pressures that occur under actual service conditions. Unvarying quality at lowest cost at the point of assembly is usually obtained by employing forging techniques that achieve a high rate of production with minimum scrap loss, and subsequent reductions in the cost of machining and processing. Consult a Steel Improvement Forging Engineer, who is backed by over 32 years of forging production experience, about how to obtain the maximum IMPROVEMENT OF METALS BY FORGING, at reasonable cost. Numerous so-called "impossible-to-forge" designs are being successfully forged by the employment of recently developed forging techniques and procedures. Fortify your product with forgings to assure its dependable performance under unpredictable service conditions.



Reference Data Booklet presents many new ideas on forgings and their applications in many different types of equipment. Copies available to engineers, metallurgists and executives.

DROP FORGINGS

THE STEEL IMPROVEMENT & FORGE CO.

942 East 64th Street CLEVELAND, OHIO

Tulsa, Okla.—National Bank of Tulsa Bldg. • Los Angeles 28, Cal.—7046 Hollywood Blvd. • New York 7, N. Y.—225 Broadway

Drop, upset and press forgings from one-half ounce to 500 pounds of carbon, alloy and stainless steels and non-ferrous metals.

able—10 and 15 kva. Current control is obtained by a multi-leaf fan-type cam mounted on the cam shaft. Cam controls a limit switch which operates a magnetic contactor or other timing device. Extending or shortening arc formed by fan cam determines duration of current dwell. Heat regulation is provided by a 5-point regulator with a heavy copper arm and contacts to carry maximum loads.

Another feature of welder is a two-way adjustment of lower arm which can be raised or lowered or shifted laterally as nature of work requires. Electrodes are water cooled.

Steel 9/30/46; *Item No.* 9626

Vapor Degreaser

Detrex Corp., 14331 Woodrow Wilson, Detroit 32, has introduced a standard conveyorized one-dip concentrator for metal cleaning operations. Called "1 DC-750",

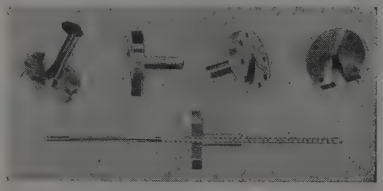
the machine is designed to degrease small screw machine parts and is ideally suited to small shops. It occupies less than 75 sq ft of floor space.

Unit may be supplied with rotary or a combination of rotary and flat baskets. Rotary baskets are 10 in. diameter by 20 in. long. Work is loaded at one end of degreaser, carried through cleaning cycle, and is returned through upper hood to same end of the machine for unloading. Conveyor system is complete with sprockets, shafts, take-up device, speed reducer and variable speed drive. All of sprockets below the vapor line are zinc plated as are all crossrods and conveyor chains.

Steel 9/30/46; *Item No.* 9629

Keyway Broaches

Zagar Tool Inc., 23880 Lakeland boulevard, Cleveland 17, has developed and is manufacturing standard keyway broaches in sizes from ⅛ to ½-in. The adapters to fit these broaches are for broaching holes from ½-in. diameter up to 1¼-in.



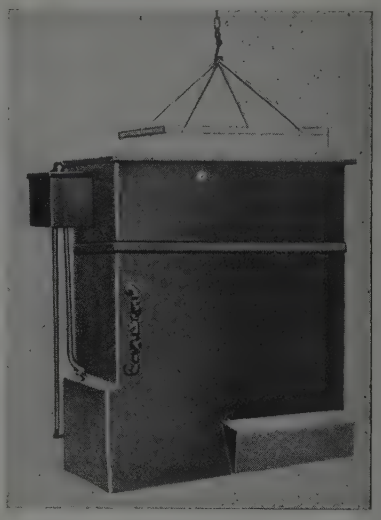
Both broaches and adapters fit the 20 in. horizontal broaching machine manufactured by the company.

Steel 9/30/46; *Item No.* 9656

Solvent Degreaser

Mabor Co., Clark Township, N. J., recently developed a production degreasing machine that uses a liquid jacket heating system which operates at atmospheric pressure, providing uniform heat and avoiding danger of solvent overheating.

Degreaser can be heated with high pressure steam without use of a pressure-reducing valve, or with gas or electricity. It also is equipped with an automatic control system that pre-heats circulating



water above dew point. An automatic oil and grease skimming device is included with the unit as standard equipment. It is equipped with safety controls.

Steel 9/30/46; *Item No.* 9604

Elapsed Time Indicator

Marion Electrical Instrument Co., Manchester, N. H., announces a model IIM3 elapsed time indicator for operation on 115 v, 60 cycle current and indicating elapsed time from zero to 9999.9 hours. Instrument features glass-to-metal hermetic seal construction which makes unit applicable particularly in chemical and allied industries.

Steel 9/30/46; *Item No.* 9642

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9647	9577	9563
9658	9640	9581
0652	9596	9608
9637	9830	9557
9627	9571	9547
9735	9648	9626
9737	9657	9621
9595	9738	9656
9600	9569	9604
9654	9529	9642

9-30-46

NAME ..... TITLE .....

COMPANY .....

PRODUCTS MADE .....

STREET .....

CITY and ZONE ..... STATE .....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

Use of Steel

(*Continued from Page* 96)

servative. Originally, bearings are greased in the factory with high-quality, long-life material. Relubrication with comparable methods and grease will prolong the life of the motor. Much damage can be done by adding dirty grease frequently. Such haphazard greasing is avoided as the bearings have to be disassembled to be maintained. The sealed bearings withstand extreme dirt test such as shown in Fig. 6 where motors are tested in dust boxes.

Motors under test are enclosed in a dust-tight chamber and driven at 1800 rpm for 8 hours out of each 24. Every 20 sec during the 24-hour period a 5 sec blast of air stirs the abrasive dust which is composed of equal portions of 600, 400 and 250 mesh emery dust. Motors cool to room temperature during overnight shutdown, and convection currents result that tend to carry dust to motor interior. At end of three-week period, motors are removed, torn down and inspected for dust penetration into windings and bearings.

Failures Traced to Insulation

Most failures are traced to damage of insulation during the winding process, or to faulty and inadequate insulation. To simplify and facilitate the winding process, slot shapes and sizes, coil shapes and sizes, and connections were all redesigned. The slot openings were enlarged. The result is that winding is much easier and there is less handling and bending of the coils with a consequent reduction of damage. Fig. 3 shows a partially wound stator.

Winding materials are of high quality, synthetic resin-covered wire. Multiple dips and bakes of thermoset varnish give a hard, smooth, and well-protected winding. Shortened coil extensions also are less vulnerable to damage. Fig. 5 shows an operator locating a crossover sleeve, one of the new steps in the procedure of winding coils of synthetic resin insulated copper wire. Continuous wound coils that reduce the number of brazed connections to a minimum are the result of this innovation. As the coil is wound on this 6-section form, the start, crossover and finish sleeves, which were put on the wire prior to winding, are located according to indexes. Another feature is the peg-board at operator's right for stacking finished coils. Pegs keep coils oriented with respect to phase relationship and order of installing in stator.

Several types of motors are attained through extensive interchangeability of parts. This is an asset of interest to the user for several reasons. The manufacture and conversion of different types is

Harder Tasks become Easier with **"HARD-DUR" GEARS**

★ "HARD-DUR" Gears preserve the tooth form. They are made only of the finest gear steels and are scientifically heat treated to obtain the maximum physical properties. They are so much stronger, harder and more wear-resistant than similar untreated gears that they are guaranteed to have four to five times the life and at only 50 per cent extra in cost.

"HARD-DUR" Gears handle the tough jobs on which ordinary gears fail and when used on the average job they last almost indefinitely.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

WHEN LEGS WERE TEETH

In the first practical application of the tooth gear drive, the "pinion" gear was a man, the teeth were his legs, and they meshed in radial steps on a large wheel. From this early conception of drive gears, development has continued up to the OTTUMWA-Sykes generated herringbone gears. This represents the most efficient and economical method extant of transmitting power between shafts whose axes are parallel.

Illustrated below is a typical set of drive gears for rolling mills, fans, rubber mill line shafts, hoists, etc. The teeth on the pinion and the gear, cut by the Sykes gear generator on a 30° helical angle, have full bearing surface and tooth contours true involute.

OTTUMWA cuts Sykes continuous tooth herringbone gears up to 10'2" dia., 24" face, complete in steel or semi-steel, or from blanks furnished by the customer. OTTUMWA likewise manufactures a complete line of SPEED REDUCERS and INCREASERS for all types of industrial drives. Our catalog will be mailed on written request.

ESTABLISHED 1867

OTTUMWA
IRON WORKS

ENGINEERS • FOUNDERS • MACHINISTS

OTTUMWA, IOWA, U. S. A.

simplified, and deliveries are improved. Fig. 1, shows an open-protected motor which can be made wall mounted or ceiling mounted by orienting the brackets 90 or 180 degrees respectively from the location shown.

Fig. 7 shows three popular types with their component parts. Left to right are splash proof, open-protected, and totally-enclosed fan-cooled. The open protected consists of stator, N, brackets, C, and rotor assembly, B. To make it splash proof the brackets, C, are oriented with their openings facing upward and the hoods, D, placed over the ends. Space between the hoods and the brackets allow air to enter and leave.

To make a totally-enclosed fan-cooled motor the frame, A, and the rotor, B, without fan are used with brackets, F, spacers, E-I and E-2, blower G, and hoods H. The brackets seal the inside and support the bearings. Air, pulled in through a hood, is directed between the frame ring and the stator iron, and exhausted out of the other hood.

Timkin to Exhibit Many Products at Exposition

A one-quarter size operating model of a 600 series Norfolk and Western railroad locomotive will be exhibited by Timken Roller Bearing Co. of Canton, O., at the Iron and Steel Exposition in Cleveland Oct. 1 to 4. Boiler and cab of this model raise up to show construction and running gear. Housings are cut away to show bearings.

Also to be exhibited by Timken are a roll neck bearing taken from a Carnegie-Illinois mill at Homestead, Pa., a roll neck bearing from an Aluminum Co. mill at Alcoa, Tenn. and a balanced proportion bearing, a new product of Timken, which is shown with a standard bearing for comparision.

Representing the company will be: Harry Robb, district manager, Pittsburgh; Ben Cook, assistant district manager, Pittsburgh; S. C. Partridge, general manager, Industrial Division, Canton; W. B. Moore, general sales manager; S. M. Weckstein, chief engineer, Industrial Division; P. L. Haager, assistant chief engineer, Industrial Division; J. W. Weir, district manager, Cleveland; A. L. Kelso, assistant district manager, Chicago; and P. J. Reeves, advertising manager.

—o—

A booklet, "Production Talks Backstands" published by Behr-Manning Division of Norton Co.; Troy, N. Y, contains seven case studies of typical installations in diversified industries. Purpose of publication is to show production advantages to be gained in belt grinding and finishing with idler backstands.

Stainless Steels

(*Concluded from Page 67*)

tance. Any coarse grinding marks remaining on the reamer transfer their pattern to the finished hole.

For good results on stainless reaming jobs, the high speed steel spiral fluted reamer with a helix angle of approximately 7 degrees is recommended. There is less tendency for this type of reamer to chatter, and better chip clearance is secured. A left hand (reverse) spiral reamer running in the opposite direction to the work is recommended. Right hand spiraling of the flutes helps the tool to cut more freely, but makes it feed into the work too rapidly. Consequently, it will be found that the left hand or reversed spiral reamer is more satisfactory.

Suggested clearances and cutting rakes shown in Fig. 5 apply to either solid or inserted-blade type reamers. These clearances avoid binding. High speed steel reamers are recommended in preference to carbon steel reamers because of their longer life.

The matter of taper reaming arises frequently. Experiment at Carpenter Steel Co. indicates that when only commercial finish is required, any one of the standard taper reamers ground for stainless will do a satisfactory job. To do this, the hole must first be carefully drilled or bored. Where fine finish and close tolerance are demanded, operators claim they can use taper turning attachments as satisfactory costs. Method of finishing a tapered hole is a mathematical problem on high production jobs.

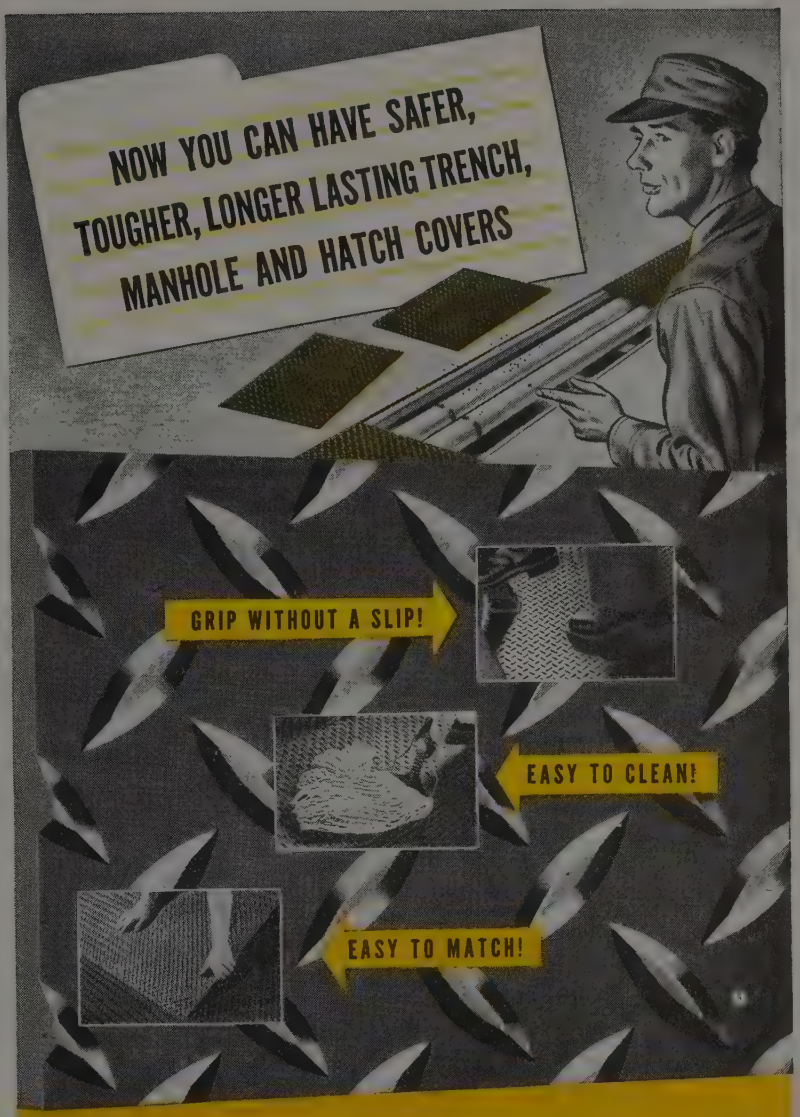
Reamers unlike drills cut on the sides instead of on the end and because the cutting edge is so long, slower speeds and correct lubrication are necessary to avoid overheating of the reamer. Besides requiring good lubrication, the oil must also be a coolant to carry away the heat that would otherwise burn the cutting edges of the reamer. (The subject of lubrication will be dealt with in Part III). Reaming produces slivers and very fine chips which can float in the lubricant and get into the work very easily.

Reamers should be handled and stored carefully. Keep them in individual racks or boxes with partitions. If the reamer is dropped on metal or hit by other tools, it may be nicked, as all unprotected areas are ground working edges. A deep nick can spoil reamer for further fine work.

(*To be continued next week*)

—o—

A simplified practice recommendation R89-46 for coated abrasive products was recently published by National Bureau of Standard of U. S. Department of Commerce. Current recommendation is a revision of original issued in 1928 which effected a reduction in stock varieties of about 75 per cent.


NOW YOU CAN HAVE SAFER, TOUGHER, LONGER LASTING TRENCH, MANHOLE AND HATCH COVERS
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The Business Trend

Strike Pulls Industrial Production Rate Down

STRIKE in an automobile body plant with resultant lowering of automobile assembly operations pulled STEEL's industrial production rate down 3 points in the week ended Sept. 21.

This 3-point decline put the rate at 151 per cent (preliminary) of the 1936-1939 average of 100, compared with the postwar high mark of 154 per cent established in the week ended Sept. 14.

Had the strike not resulted in a lowering of auto production, a new postwar high for auto output probably would have been attained. However, auto production for the week ended Sept. 21 reached only 81,162 passenger cars and trucks, compared with 88,888 in the previous week.

While auto assemblies declined, steel ingot production, electric power output, and freight carloadings remained at high levels.

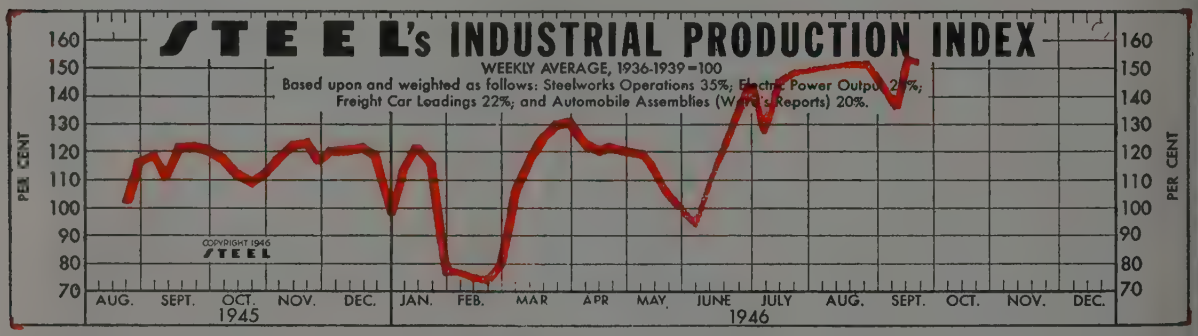
COAL—Production of an estimated 12,690,000 tons of bituminous coal in the week ended Sept. 14 was the highest output since the week ended Mar. 30. This helped bring this year's production up to within 12.4 per cent of the output for the corresponding period of 1945.

PRICES—Continuing its decline of the previous two weeks, the U. S. Bureau of Labor Statistics average of wholesale prices eased off 0.2 per cent during the week ended Sept. 14 as decreases in prices for some foods more than offset advances for other commodities. The bureau's average for that week was 121.7 per cent of the 1926 average.

RAILROADS—Based on advance reports from 86 Class 1 railroads, whose revenues represent 80.8 per cent of total revenues, the estimated total railroad operating revenues in August decreased 6.7 per cent under August, 1945. Estimated freight revenue in August, 1946, was slightly greater than in August, 1945, while estimated passenger revenues decreased 27.8 per cent. Measured in ton-miles, the volume of freight traffic handled by Class 1 railroads in August, 1946, was 5 per cent under that of August, 1945, but was 88 per cent greater than in August, 1939. During the first eight months of 1946, the ton-miles of revenue freight decreased 21.6 per cent under the corresponding period of 1945.

CONSTRUCTION—Reflecting effects of materials shortages and government regulations on building, the total of all building and construction contracts awarded in August in the 37 states east of the Rocky mountains fell to $679,909,000 in August, compared with $717,991,000 in July, according to F. W. Dodge Corp., New York.

FOUNDRY EQUIPMENT—Orders placed for foundry equipment in August rose approximately 19 per cent above the total for July. Although orders for repair parts increased only slightly they continued at a high level. Nearly all of the gain in total orders represented orders for new equipment.



The Index (see chart above): Latest Week (preliminary) 151 | Previous Week 154 | Month Ago 152

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)‡	90	89.5	89	83
Electric Power Distributed (million kilowatt hours)	4,507	4,521	4,444	4,019
Bituminous Coal Production (daily av.—1000 tons)	2,115	1,860	1,998	2,053
Petroleum Production (daily av.—1000 bbls.)	4,774	4,773	4,836	4,528
Construction Volume (ENR—Unit $1,000,000)	$124.8	$86.2	$97.0	$53.2
Automobile and Truck Output (Ward's—number units)	81,162	88,888	91,360	10,570

* Dates on request. ‡ 1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.

TRADE

Freight Carloadings (unit—1000 cars)	910†	907	885	837
Business Failures (Dun & Bradstreet, number)	19	31	17	23
Money in Circulation (in millions of dollars)‡	$28,453	$28,499	$28,365	$27,777
Department Store Sales (change from like week a year ago)†	+37%	+50%	+90%	+8%

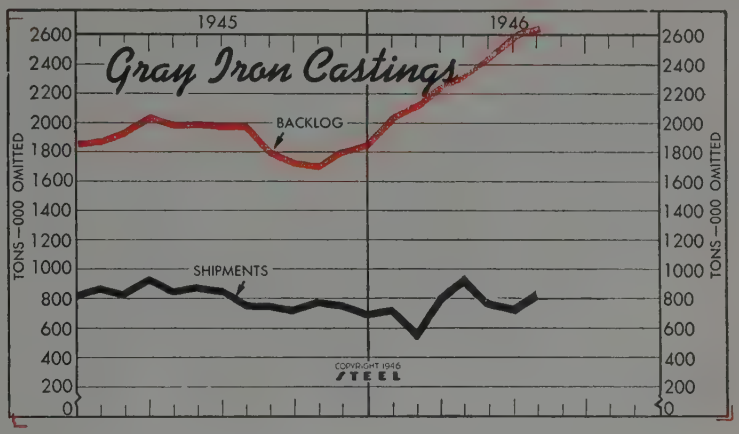
† Preliminary. ‡ Federal Reserve Board.

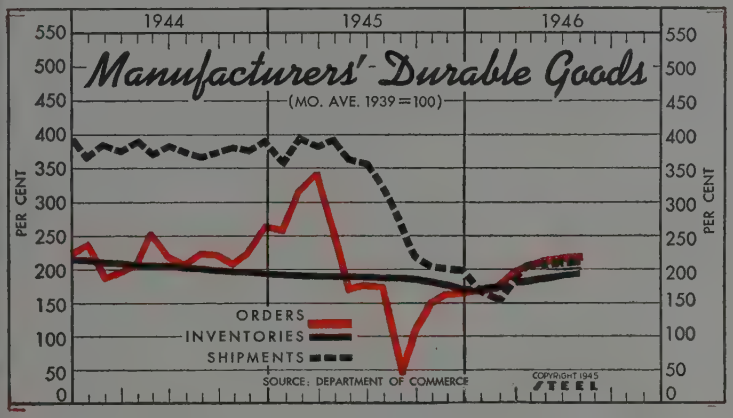
Gray Iron Castings

(U. S. Bureau of Census)
Tons—000 omitted

	Shipments 1946	Shipments 1945	Backlogs* 1946	Backlogs* 1945
Jan.	706	862	2.077	1.922
Feb.	541	816	2.153	1.998
Mar.	796	928	2.265	2 089
Apr.	857	843	2.378	2.032
May	757	867	2.192	2.031
June	735	849	2 633	2.016
July	811	749	2,669	2 015
Aug.	...	750	....	1,818
Sept.	...	718	....	1,755
Oct.	...	767	....	1.742
Nov.	...	751	....	1,847
Dec.	...	678	....	1,877
Mo. Ave.	...	798	....	1,928

*Unfilled orders for sale to the trade.





Index of Manufacturers' Durable Goods

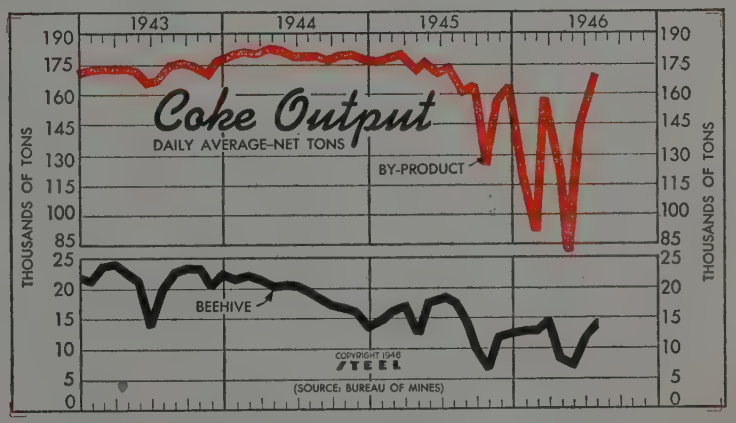
(Mo. Ave. 1939 = 100)

	Orders 1946	Orders 1945	Shipments 1946	Shipments 1945	Inventories 1946	Inventories 1945
January	176	267	169	351	171	190
February	179	326	153	394	174	189
March	203	351	183	382	181	189
April	219	267	203	389	182	189
May	224	177	207	361	184	189
June	226	182	212	356	190	189
July	226	179	216	320	196	187
August	...	53	...	262	...	185
September	...	121	...	216	...	185
October	...	160	...	203	...	182
November	...	171	...	200	...	177
December	...	172	...	199	...	171
Average	...	202	...	303	...	185

Coke Output

Bureau of Mines
(Daily Average—Net Tons)

	By-Product 1946	By-Product 1945	Beehive 1946	Beehive 1945
Jan.	122,570	179,879	13.069	14,745
Feb.	93,985	180,727	13,064	16,210
Mar.	161,290	182,120	14,897	17,115
Apr.	128.394	174.239	811	12,554
May	83.019	178.338	708	17,963
June	147 272	172 201	12 103	19 616
July	171,689	175,163	14,635	17,682
Aug.	.....	163,567	.....	14,069
Sept.	.....	166,559	.....	9,924
Oct.	.....	127,173	.....	6.407
Nov.	.....	159,646	.....	12 218
Dec.	.....	166,648	.....	12,659
Ave.	.....	168,855	.....	14,230



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$14,029	$11,409	$12,163	$11,446
Federal Gross Debt (billions)	$265.5	$265.7	$267.7	$262.6
Bond Volume, NYSE (millions)	$38.8	$41.8	$17.0	$30.1
Stocks Sales, NYSE (thousands)	10,688	12,723	4,506	7,065
Loans and Investments (billions)†	$59.2	$59.1	$59.9	$61.8
United States Government Obligations Held (millions)†	$40,595	$40,492	$41,460	$45,823

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$64.45	$64.45	$64.45	$58.27
All Commodities†	121.7	122.0	128.3	104.7
Industrial Raw Materials†	138.4	137.5	146.3	115.0
Manufactured Products†	115.9	116.9	122.9	101.8

† Bureau of Labor Statistics Index, 1926=100.

names worth remembering . . .

★★★★★ **COWLES** . . . for the introduction, in 1886, of a type of electric furnace still used for graphite and aluminum production today.

★★★★★ **INTERNATIONAL** for graphite electrodes that consume S-L-O-W-L-Y

FOR LOWEST electrode cost per ton of production — for fewest shut-downs for electrode replacement — you want electrodes that consume *slowly*. And slow *consumption* is one of the outstanding properties of INTERNATIONAL Graphite Electrodes. It's *built in* by INTERNATIONAL methods of scientifically controlled manufacturing at every step. The result is the low electrical resistance of INTERNATIONAL electrodes that means longer, trouble-free service life — and lower power costs, too. And the uniformity of their structure assures not only *slow* burning but *even* burning. Because they are so completely graphatized, INTERNATIONAL electrodes, in repeated tests, have shown less tendency to oxidize or burn at a fixed temperature than any other graphite electrodes available.

Add in the other cost-saving properties of INTERNATIONAL electrodes listed below and you'll understand why they are performing so economically under all conditions of today's electric furnace practice. Write for details today.

OTHER ADVANTAGES: High current capacity • Low rate of oxidation • High thermal conductivity • High degree of purity • Consistently uniform properties and dimensions • Low cost per ton of production • High shock and abrasion resistance

SP 274A

International Graphite & Electrode Corp.
SAINT MARYS, PA.

Mill Overload Causes Some Decline in Steel Buying

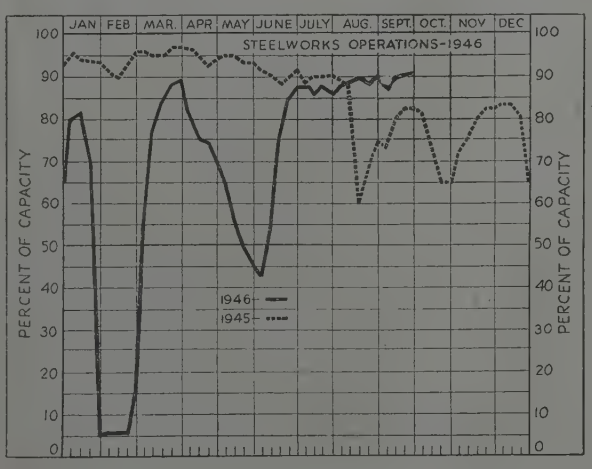
Conservative spirit growing among consumers . . . Present steelmaking rate promises better balance with demand

IN SPITE of heavy pressure for many products, demand for steel is a shade easier. There is great disposition among manufacturers to bring steel and other raw materials and products components into closer balance and to hold up on steel where it appears that commitments are excessive and there is greater conservatism in consumer plant expansion than at any time since the end of the war.

Difficulties in obtaining materials, especially under present restrictions on nonhousing construction, OPA price limitations and uncertainties with respect to labor, all producing an unsettled outlook on profits, are contributing to this situation.

Some trade leaders believe if steel production could be sustained at the present high rate, demand and supply could be brought into fairly close balance by early next year in a number of products. There would be exceptions, notably in light flat-rolled products, for which demand is far in excess of capacity, and in products on which there is little or no profit. Nevertheless, several months of high output would accomplish a great deal, especially if the present more conservative tone of buying continues. Even in cold-rolled sheets, perhaps scarcest of all major products, there should be some relief by second quarter, when important expansion should be completed and in operation. There is grave doubt of ability of mills to sustain present production rates, especially in view of the serious scrap shortage, and on the other hand demand for steel products generally remains heavy, with backlogs far extended.

Various producers are well behind on current commitments. On some products they are so heavily loaded and so uncertain as to the extent of preference tonnage for fourth quarter that they still are unable to open books formally for next year. In fact, some mills may not take formal action at all in view of existing overloaded conditions but rather just ease into next year's schedules with as little formality as possible, accepting tonnages here and there from regular customers as urgency requires. There are indications that no little tonnage already is being booked in this way and when the time arrives when they know approximately where they stand on the year's carryover it may be found they already are fully committed for first quarter and even well beyond in some cases.



DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended Sept. 28	Change	Same Week 1945	Same Week 1944
Pittsburgh	97	— 0.5	75	91
Chicago	90.5	+ 0.5	91	99.5
Eastern Pa.	81	None	76	95
Youngstown	90	+ 1	80	88
Wheeling	93.5	None	88	96
Cleveland	93.5	+ 2.5	83	74.5
Buffalo	90.5	None	86	86
Birmingham	99	None	95	70
New England	90	— 5	80	89
Cincinnati	84	+ 3	86	91
St. Louis	72.5	+ 7	68	75
Detroit	81	— 1	85	88
Estimated national rate	90.5	+ 0.5	88	93.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

One difficulty confronting mills in making formal announcement is that on certain products at least they likely would be flooded with inquiries they could not handle, especially in sheets and hot-rolled carbon bars, among other products.

At the same time there are mills which are openly soliciting tonnage for next year, or if not actually soliciting are at least entering tonnage for regular customers. This is true in alloy steels, cold-drawn carbon bars, cold-rolled narrow strip, some rail accessories and mechanical and boiler tubing. Some plate producers have been accepting orders to the extent that they are well booked into second quarter. In fact, one eastern plate mill is fully scheduled for first half.

Steel production continues high, the estimated national rate for last week reaching 90½ per cent of capacity, highest since the week ending July 28, 1945, when the same level was reached. A few small gains were made over the prior week, Chicago gaining ½-point to 90½ per cent, Cleveland 2½ points to 93½, Youngstown 1 point to 90, Cincinnati 3 points to 84, and St. Louis 7 points to 72½. Pittsburgh receded ½-point to 97, New England 5 points to 90 and Detroit 1 point to 81 from a revised figure for the preceding week. Unchanged rates were as follows: Wheeling 93½, Buffalo 90½, eastern Pennsylvania 81, Birmingham 99 and West Coast 84.

Average composite prices of steel and iron products are unchanged at levels of the past few weeks. Finished steel composite is $64.45, semifinished steel $40.60, steelmaking pig iron $27.50 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Sept. 28	Sept. 21	Sept. 14	One Month Ago Aug., 1946	Three Months Ago June, 1946	One Year Ago Sept., 1945	Five Years Ago Sept., 1941
Finished Steel	$64.45	$64.45	$64.45	$64.45	$64.09	$58.27	$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	27.50	27.50	27.50	27.50	27.50	24.00	23.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Sept. 28, 1946	Aug., 1946	June, 1946	Sept., 1945
Steel bars, Pittsburgh	2.50c	2.50c	2.50c	2.25c
Steel bars, Philadelphia	2.86	2.86	2.62	2.57
Steel bars, Chicago	2.50	2.50	2.50	2.25
Shapes, Pittsburgh	2.35	2.35	2.35	2.10
Shapes, Philadelphia	2.48	2.48	2.465	2.215
Shapes, Chicago	2.35	2.35	2.35	2.10
Plates, Pittsburgh	2.50	2.50	2.50	2.25
Plates, Philadelphia	2.558	2.558	2.56	2.30
Plates, Chicago	2.50	2.50	2.50	2.25
Sheets, hot rolled, Pittsburgh	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Pittsburgh	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Pittsburgh	4.05	4.05	4.05	3.70
Sheets, hot-rolled, Gary	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Gary	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Gary	4.05	4.05	4.05	3.70
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2.35	2.10
Cold-rolled strip, Pittsburgh	3.05	3.05	3.05	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	3.05	2.75
Wire nails, Pittsburgh	3.75	3.55	3.25	2.90
Tin plate, per base box, Pittsburgh	$5.25	$5.25	$5.25	$5.00

Semifinished Material

	Sept. 28, 1946	Aug., 1946	June, 1946	Sept., 1945
Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$38.00	$36.00
Slabs, Pittsburgh, Chicago	39.00	39.00	39.00	36.00
Rerolling billets, Pittsburgh	39.00	39.00	39.00	36.00
Wire rods, No. 5 to 9/32-inch, Pitts.	2.30c	2.30c	2.30c	2.15c

Pig Iron

	Sept. 28, 1946	Aug., 1946	*June, 1946	Sept., 1945
Bessemer del. Pittsburgh	$29.77	$29.77	$27.69	$26.19
Basic, Valley	28.00	28.00	26.00	24.50
Basic, eastern del. Philadelphia	29.93	29.93	27.84	26.34
No. 2 fdry., del. Pgh. N. & S. sides	29.27	29.27	27.19	25.69
No. 2 foundry, Chicago	28.50	28.50	26.50	25.00
Southern No. 2, Birmingham	24.88	24.88	22.88	21.38
Southern No. 2, del. Cincinnati	28.94	28.94	26.94	25.44
No. 2 fdry., del. Philadelphia	30.43	30.43	28.34	26.84
Malleable, Valley	28.50	28.50	26.50	25.00
Malleable, Chicago	28.50	28.50	26.50	25.00
Charcoal, low phos., fob Lyles, Tenn.	33.00	33.00	33.00	33.00
Gray forge, del. McKees Rocks, Pa.	28.61	28.61	28.55	25.05
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.38

Scrap

	Sept. 28, 1946	Aug., 1946	*June, 1946	Sept., 1945
Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	25.00	20.00	20.00	20.00

Coke

	Sept. 28, 1946	Aug., 1946	*June, 1946	Sept., 1945
Connellsville, furnace ovens	$8.75	$8.75	$8.75	$7.50
Connellsville, foundry ovens	9.50	9.50	9.50	8.25
Chicago, by-product fdry., del.	15.10	15.10	13.75	13.75

* $2 higher on bessemer, basic, foundry and malleable on adjustable pricing contracts.

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, $33, fob mill; forging, quality, $38, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $48.69.

Rerolling, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41; Duluth (billets), $41; Pac. ports (billets), $51. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co., $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., $58.64, Pas. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49; Duluth, billets, $49; forging billets fob Pac. ports, $59

(Andrews Steel Co. may quote carbon forging billets $5C gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co., $64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $58.43; del. Detroit $60.43; eastern Mich. $61.43.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—5/16 in. inclusive, per 100 lb, $2.30. Do., over 5/16—41/64-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.86c; Phila., del., 2.86c; Gulf ports, dock, 2.85c; Pac., ports, dock, 3.15c. (Sheffield Steel Corp. may quote 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., 2.55c, fob Chicago.)

Rail Steel Bars: Same prices as for hot-rolled carbon cars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.921c; Detroit, del., 3.021c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.108	4300	$1.839
2300	1.839	4600	1.298
2500	2.759	4800	2.326
3000	0 541	5100	0.379
3100	0.920	5130 or 5152	0.494
3200	1.461	6120 or 6152	1.028
3400	3.462	6145 or 6150	1.298
4000	0.487	8612	0.703
4100 (.15-.25 Mo)	0.757	8720	0.757
(.20-.30 Mo)	0.812	9830	1.407

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.625c; Detroit, del., 3.725c, eastern Mich.; 3.755c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, 2.50c; Gulf ports, dock, 2.70c; Pacific ports, dock, 2.75c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Gulf ports, dock, 2.70c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.525c; eastern Mich., del., 2.575c; Phila., del., 2.615c; New York, del., 2.685c; Pacific ports, 2.975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 3.00c on hot carbon sheets, Sparrows Point, Md.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.635c; pacific ports, 3.925c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.31c; Phila., del., 4.24c; Pacific ports, 4.60c.

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, hot-dipped, coils or cut to lengths 9.00c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pacific ports, 3 85c; 20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3 95c; Pacific ports, 4.45c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4.65c	4.00c
Armature	4.25c	5.00c	4.35c
Electrical	4.75c	5.50c	4.85c
Motor	5.425c	6.175c	5.525c
Dynamo	6.125c	6.875c	6.225c
Transformer			
72	6.625c	7.375c	....
65	7.625c	8.375c	....
58	8.125c	8.875c	....
52	8.925c	9.675c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary Cleveland, Birmingham, Youngstown, Middletown, 6-in. and narrower: Base, 2.45c; Detroit, del., 2.55c; eastern Mich., del., 2.60c; Pacific ports, 3.10c. (Superior Steel Corp. may quote 3.30c, Pitts.)

Over 6-in.: Base, 2.35c; Detroit, del., 2.45c; eastern Mich., del., 2.50c; Pacific ports, 3.00c. (Superior Steel Corp. may quote 3.20c, Pitts.)

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c. (Superior Steel Corp. may quote 4.70c, Pitts.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base, 0.26-0.50 carbon, 3.03c. Add 0.20c for Worcester.

Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point, $4.65.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 15-lb $14.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.).

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.71c; Phila., del., 2.558c; St. Louis, 2.74c; Boston, del., 2.86c; Pacific ports, 3.05c; Gulf ports, 2.85c.

(Granite City Steel Co. may quote carbon plates 2.65c fob DPC mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c base.)

Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.40c; Gulf ports, 4.10c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.787c; Gulf ports, 4.273c; Pacific ports, 4.49c.

Clad Steel Plates: Coatesville, 10% cladding: nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.54c; Phila., del., 2.48c; Pacific ports, 3.00c; Gulf ports, 2.70c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

Wire to Manufacturers in carloads	
Bright basic or bessemer	*$3.05
Spring (except Birmingham)	*$4.00
Wire Products to Trade	
Nails and staples	
Standard and cement-coated	†$3.75
Galvanized	‡$3.40
Wire, Merchant Quality	
Annealed	§$3.50
Galvanized	§$3.85
(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)	
Woven fence, 15½ gage and heavier	72
Barbed wire, 80-rod spool	**79
Barbless wire, twisted	**79
Fence posts	74
Bale ties, single loop	72½

*Add $0.10 for Worcester, $0.05 for Duluth and $0.50 for Pacific ports.

†Add $0.30 for Worcester, $0.50 for Pacific ports. Nichols Wire & Steel may quote $4.25; Pittsburgh Steel Co., $4.10.

‡Add $0.50 for Pacific ports.

§Add $0.10 for Worcester; $0.70 Pacific ports.

**Pittsburgh Steel Co. may quote 89.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Welded

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	53	30	⅛	21	0½
¼ & ⅜	56	37½	¼	27	7
½	60½	48	1-1¼	31	13
¾	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25½	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Rolled
1"	13	....	$9.90	$9.36	$9.65
1¼"	13	....	11.73	9 63	11.43
1½"	13	$10.91	12.96	10.63	12.64
1¾"	13	12.41	14.75	12.10	14.37
2"	13	13.90	16.52	13 53	16.19
2¼"	13	15.50	18.42	15 06	18 03
2¼"	12	17.07	20.28	16.57	19 83
2½"	12	18.70	22 21	18.11	21.68
2⅝"	12	19.82	23.54	19.17	22.95
3"	12	20 79	24.71	20.05	24.02
3½"	11	26.24	31.18	25.30	30.29
4"	10	32.56	38 68	31.32	37.52
4½"	9	43.16	51 29	....	....
5"	9	49 96	59 36	....	....
6"	7	76.71	91.14	....	....

Pipe, Cast Iron: Class B. 6-in. and over, $60 per net ton, Birmingham; $65, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher. Class A pipe, $3 a ton over class B.

Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.

Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates $51 net ton, base, Standard spikes, 3.65c.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.

(Ceiling prices advanced 12 per cent, effective July 27, 1946; discounts remain unchanged.)

Carriage and Machine

½ x 6 and smaller	65¼ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-in. and smaller	..	64
1-in. and smaller	62	..
1⅛-in.-1-in.	..	60
1⅛-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1⅝-in. and larger	56	..

Additional discount of 10 for full kegs.

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural	4.75c
⅞-inch and under	*65-5 off

*Plus 12 per cent increase on base prices, effective July 26.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	....	72.49c
1.5	4	1	8.5	58.43c
....	4	2	8	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

CHROMIUM NICKEL STEELS

	Bars	Plates	Sheets	H.R. Strip	C.R. Strip
302	25 96c	29 21c	36 79c	23.93c	30.30c
303	28.13	31 38	38 95	29 21	35.71
304	27.05	31 38	38 95	25.45	32.46
308	31 38	36 79	44 36	30.84	37.87
309	38.95	43 28	50 85	40.03	50 85
310	53.02	56.26	57 35	52.74	60.59
312	38.95	43.28	53 02	....	....
*316	43.28	47 61	51 94	43.28	51.94
§321	31.38	36.79	44.36	31.65	41.12
†347	35.71	41.12	48 69	35.71	45.44
431	20.56	23 80	31.38	18.94	24.35

STRAIGHT CHROMIUM STEEL

403	23 93	26.51	31 92	22.99	29.21
**410	20.02	23.93	28 67	18.39	23.80
416	20.56	23 80	29 21	19 75	25.45
††420	25.96	30.84	36 25	25.70	39.49
430	20.56	23 80	31 38	18.94	24.35
‡‡430F	21 10	24.35	31 92	20.29	26.51
440A	25.96	30 84	36 25	25 70	39.49
442	24.35	27 59	35 17	25 96	34.62
443	24.35	27 59	35 17	25 96	34.62
446	29.76	33.00	39 49	37.87	56.26
501	8.66	12.98	17 04	12.98	18.39
502	9.74	14.07	18.12	14.07	19.48

STAINLESS CLAD STEEL (20%)

(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

304	.....	19.48	20 56	.....	.....
410	.....	17 31	18 39	.....	.....
430	.....	17 85	18 94	.....	.....
446	.....	19.48	20.56	.....	.....

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$8.75
Connellsville, foundry	9.25- 9.75
New River, foundry	10 25-10.50
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00
By-Product Foundry	
Kearney, N. J., ovens	14.40
Chicago, outside delivered	14.35
Chicago, delivered	15.10
Terre Haute, delivered	14.85
Milwaukee, ovens	15.10
New England, delivered	16.00
St. Louis, delivered	†15.10
Birmingham, delivered	12.25
Indianapolis, delivered	14.85
Cincinnati, delivered	14.60
Cleveland, delivered	14.55
Buffalo delivered	14.75
Detroit, delivered	15.10
Philadelphia, delivered	14.63

* Operators of hand-drawn ovens using trucked coal may charge $9.35; retroactive to May 17, 1946, on adjustable pricing.

† 15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha.	
Pure and 90% benzol	15.00c
Toluol, two degree	22.00c
Industrial xylol	22.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.00c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-gage and lighter 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider than 6-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold-finished bars	Cold-rolled strip
Boston	4.356[1]	4.203[1]	4.203[1]	6.039[1]	4.050[1]	5.548[1]	4 418[1]	5 725[14]	5.031[14]	4.656[22]	4.968
New York	4 134[1]	4.038[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.838[14]	4.584[22]	5 075
Jersey City	4.155[1]	4.018[2]	4 019[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5 501[13]	4.890[14]	4 605[22]	5 075
Philadelphia	4.114[1]	3.937[2]	3.875[1]	5.564[1]	3 774[2]	4.664[1]	4.554[1]	5.499[13]	5.139[22]	4.564[22]	5.064
Baltimore	4.093[1]	4.05[1]	3.865[1]	5.543[1]	3.64[1]	4.298[1]	4.198[1]	5.365[13]	5.118[22]	4.543[22]	.....
Washington	4.232[2]	4.22[1]	4.067[2]	5.632[2]	3.842[2]	4.432[2]	4.332[2]	5.667[13]	5.007[22]	4.532[22]	.....
Norfolk, Va.	4.377[2]	4.303[1]	4.262[2]	5.777[2]	4.087[2]	4.927[2]	4.477[2]	5.862[13]	4.552[22]	4.677[22]	.....
Bethlehem, Pa.*	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.70[2]	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3 60[1]	3.65[1]	3.92[1]	5.55[1]	3.575[1]	4.21[1]	4.11[1]	5.20[13]	4.625[13]	4.20[22]	4 90
Buffalo (country)	3 50[1]	3.55[1]	3.55[1]	5.15[1]	3 475[1]	3 85[1]	3 750[1]	5.10[13]	4.525[13]	4 10[22]	4 60
Pittsburgh (city)	3 60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.327[13]	4.625[22]	4 20[22]	4 70
Pittsburgh (country)	3 50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[13]	4.525[22]	4.10[22]	4 60
Cleveland (city)	3 60[1]	3.88[1]	3.65[1]	5.48[1]	3.575[1]	3 95[1]	3 850[1]	5.347[13]	4 625[22]	4 20[22]	4 70
Cleveland (country)	3 50[1]	.. .	3 55[1]	.. ..	3.475[1]	3.85[1]	3 750[1]	.. ..	4.525[22]	4.10[22]	4.60
Detroit	3.70[1]	3.952[1]	3.90[1]	5.572[1]	3.675[1]	4.050[1]	3 950[1]	5.491[13]	4.725[22]	4.25[13]	4.95
Omaha (city, del.)	4 32[1]	4.37[1]	4 37[1]	5.97[1]	4 045[1]	4.52[1]	4 42[1]	6.00[13]	5.72[22]	4.945[22]	.....
Omaha (country)	4 22[1]	4.27[1]	4.27[1]	5.87[1]	3 945[1]	4.42[1]	4.32[1]	5.90[13]	..	..	.....
Cincinnati	3.902[2]	3.983[2]	3.952[2]	5.583[2]	3.671[2]	4.046[2]	3.946[2]	5.296[13]	4.271[22]	4.602[22]	.....
Youngstown*	.....	.....	.....	.....	.....	.....	.....	4.85[13]	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.475[2]	3.35[2]	3.750[2]	5 10[13]	.....	.....	.....
Chicago (city)	3 75[1]	3.80[1]	3 80[1]	5.40[1]	3 475[1]	3 95[2]	3 850[1]	†5 40[13]	4.425[22]	4.20[22]	4 90
Milwaukee	3.908[1]	3 958[1]	3.958[1]	5.558[1]	3 633[2]	4.108[1]	4 008[1]	†5.558[13]	4.583[22]	4.358[22]	5 058
Indianapolis	3 83[1]	3.88[1]	3 88[1]	5.48[1]	3 743[1]	4 118[2]	4 018[2]	5.368[13]	4.793[22]	4.43[22]	5 066
St. Paul	4 092[2]	4 142[2]	4 142[2]	5 742[2]	3 817[2]	4.292[2]	4.192[2]	5 666[13]	4.767[22]	4 852[22]	5 306
St. Louis	3.918[1]	3.968[1]	3.968[1]	5.568[1]	3.643[1]	4.118[2]	4.018[2]	5.622[13]	4.593[22]	4.522[22]	5.221
Memphis, Tenn.	4 296[1]	4.346[2]	4.346[2]	6.071[1]	4 221[2]	4.596[2]	4.496[2]	5.746[13]	..	4.821[22]	.....
Birmingham	3 75[1]	3 80[1]	3.80[1]	6.158[1]	3.675[1]	4 05[1]	4.05[1]	5 20[13]	5.077[22]	4.99[21]	5.485
New Orleans (city)	4 358[1]	4.408[1]	4.408[1]	6.329[1]	4.283[1]	4 658[1]	....	5.808[13]	5.304[22]	5.079[22]	.....
Houston, Tex.	4 00[2]	4.50[1]	4.50[1]	5.75[2]	3.988[2]	4 668[2]	4.568[2]	5.768[13]	5.819[22]	4.10[22]	.....
Los Angeles	4 65[4]	4.90[4]	5.20[4]	7.45[4]	5.225[4]	5.30[4]	5.200[4]	6.55[13]	7.425[4]	6.033[22]	5.800
San Francisco	4 20[7]	4.15[7]	4 15[7]	5.85[1]	4 125[1]	5.85[7]	4 50[7]	6.35[13]	6.875[13]	5 783[22]	7.588
Portland, Oreg.	4 70[27]	4.70[27]	5.00[27]	6.75[27]	4.875[27]	6.65[27]	5.000[27]	6.20[13]	6 825[13]	5.983[13]	.....
Tacoma, Wash.	4 60[4]	4.70[4]	5.00[4]	6.75[4]	4.87[4]	5 80[4]	4.60[4]	6.40[13]	6.55[13]	6.23[22]	.....
Seattle	4.60[4]	4.70[4]	5.00[4]	6.75[4]	4.87[4]	5.80[4]	4.60[4]	6.40[13]	6.55[13]	6.23[22]	.....

*Basing point cities with quotations representing mill prices, plus warehouse spread; †open market price.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 9999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39 999 pounds; [8]—under 2000 pounds, [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds, [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds, [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.45
Mesabi nonbessemer	5 05
High phosphorus	5 05
Mesabi bessemer	5 20
Old range nonbessemer	5.30

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe, 6-10% Mn	Nom.
N. African low phos	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, N. African basic, 50 to 60%	Nom.
Brazil iron ore 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

($ $ paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41 00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28 30
48% no ratio	31 00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	$28.90
48% no ratio	31.00
48% 3:1 lump	41.00

Domestic (seller's nearest rail)

48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnaces

Designation	Chemical Composition Limits, Per Cent C	Mn	Si	Cr	Ni	Mo	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	$0.812	$16.230	$1.353	$27.050
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.812	16.230	1.353	27.050
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.866	17.312	1.407	28.132
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.703	14.066	1.244	24.886
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.298	25.968	1.677	33.542

Extras are in addition to a base price of 2.921c, per pound on finished products and $58.43 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

PIG IRON

Maximum prices per gross ton fixed by OPA schedule No. 10, last amended July 27, 1946; $2 increase may be charged on adjustable pricing contracts made between May 29 and July 27. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$29.50	$29.00	$30.50	$30.00
Newark, N. J., del.	31.20	30.70	32.20	31.70
Brooklyn, N. Y., del.	32.28	....	....	32.78
Birdsboro, Pa., base	29.50	29.00	30 50	30.00
Birmingham, base	24.88	23.50	29.50	....
Baltimore, del.	30.22	....	....	....
Boston, del.	29.68	....	....	....
Chicago, del.	28.72	....	....	....
Cincinnati, del.	28.94	28 06	....	....
Cleveland, del.	28.62	27.74	....	....
Newark, N. J.	30.82	....	....	....
Philadelphia, del.	30.05	29.55	....	....
St. Louis, del.	28.62	29 54	....	....
Buffalo, base	28.50	27.50	29.50	29.00
Boston, del.	30.06	29.56	31.06	30.56
Rochester, del.	30.03	....	31.03	30.53
Syracuse, del.	30.58	....	31.58	31.08
Chicago, base	28.50	28.00	29.00	28.50
Milwaukee, del.	29.73	29.23	30.23	29 73
Muskegon, Mich., del.	32.05	..	..	32.05
Cleveland, base	28.50	28 00	29 00	28 50
Akron, Canton, del.	30.04	29.54	30.54	30.04
Detroit, base	28.50	28.00	29.00	28.50
Saginaw, Mich., del.	30.81	30.31	31.31	30.81
Duluth, base	29.00	28.50	29 50	29.00
St. Paul, del.	31.13	30 63	31.63	31.13
Erie, Pa., base	28.50	28.00	29.50	29 00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.06	29.56	31 06	30.56
Granite City, Ill., base	28.50	28.00	29.00	28.50
St. Louis, del.	29.00	28.50	....	29 00
Hamilton O., base	28.50	28.00	....	28.50
Cincinnati, del.	29.68	29 18	....	29.68
Neville Island, Pa., base	28.50	28.00	29.00	28.50
*Pittsburgh, del., N.&S. sides	29.27	28.77	29.77	29.27
Provo, Utah, base	26.50	26.00	....	....
Sharpsville, Pa., base	28.50	28.00	29.00	28.50
Sparrows Point, base	29.50	29.00	....	....
Baltimore, del.	30.60	..	....	....
Steelton, Pa., base	....	29.00	....	....
Swedeland, Pa., base	29.50	29.00	30.50	30.00
Philadelphia, del.	30.43	29.93	....	30.93
Toledo, O., base	28.50	28.00	29.00	28.50
Youngstown, O., base	28.50	28.00	29.00	28.50
Mansfield, O., del.	30.66	30.16	31.16	30.66

* To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.24, Oakmont, Verona; $1.38, Brackenridge.

Exceptions to above prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron. Republic Steel Corp. may quote $2 a ton higher for foundry and basic pig iron on the Birmingham base.

High Silicon, Silvery

6.00-6.50 per cent (base) $34.00
6.51-7.00 $35.00 9.01- 9.50. 40.00
7 01-7.50.. 36.00 9.51-10.00. 41.00
7.51-8.00.. 37.00 10.01-10.50 42.00
8.01-8.50.. 38.00 10.51-11.00 43.00
8 51-9.00.. 39.00 11.01-11.50. 44.00

Fob Jackson county, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, $50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $28.00
Valley basc 28.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $34.00 base; $35.38, del., Philadelphia. Intermediate phosphorus, Central Furnace, Cleveland, $31.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0 50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 65.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.
Chrome brick 54.00
Chem. bonded chrome 54.00
Magnesite brick 76 00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net ton, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20 80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0 0655c, less 0.068c, eastern, freight allowed; 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Ferrotungsten: Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb. contained Mo, fob. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9 95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferro-Boron: (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices up 10 cents.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 15.05c, ton lots 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; **high carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0 5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points. **Low carbon, high nitrogen:** Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C about 5-7%): Contract, lump, packed, eastern zone, freight allowed, c.l. 15.60c, ton lots 16.10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, high carbon (Cr 60-65%, Si, Mn and C 4-6% each): Contract, lump, packed, eastern zone, freight allowed, c.l. 16.15c, ton lots 16.65c, less ton 17.30c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Prices are per lb of contained chromium; spot prices 0.25c higher. Deduct 0.55c for bulk carlots.

S.M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1 25% max.) Contract, carlot, bulk, 20.00c, packed 20 45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.50c, 20 95c and 22.65c, central: 21.00c, 21 45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb. Cr, packed, eastern zone, c.l. 9.50c, ton lots 9.80c, less than ton 10.10c, central zone, add 0.3c for c l. and 0.5c for smaller lots; western zone, add 0.70c for c.l. and 2c for smaller lots. Deduct 0.30c for bulk carlots. Prices per lb. of briquets; spot prices 0.25c higher.

Chromium Metal: 97% min. chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61

central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19 10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15 50c eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk; c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb. Mn and about ½ lb. Si, eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l. and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. **Ferrosilicon,** weighing about 5 lb. and containing exactly 2 lb. Si, or about 2½ lb. and containing exactly 1 lb. Si, packed, eastern zone, c.l. 3.90c, ton lots 4.15c, less ton lots 4.45c; central zone, add 0.15c for c.l. and 0.40c for smaller lots; western zone, add 0.30c for c.l. and 0.45c for smaller lots. Prices are f.o.b. shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.30c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1.89, less $2 01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 8 ton, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c.

Silvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59 00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c.

SMZ Alloy: (Si 60-55%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4 50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1 25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c and 13.00c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Zirconium Alloy: 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up $5 per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump per lb 5.88c; ton lots 6.38c; less 6.88c. Spot up ½c.

Siminal: (Approx. 20% each Si, Mn, Al) Contract, freight not exceeding St. Louis rate allowed, per lb alloy; carlots 8c; ton lots 8.75c; less-ton lots 9.25c.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2 60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5, fob plant, freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, delivered at consumer's plant except where noted. For complete OPA price schedule refer to MPR-4

OPEN HEARTH AND BLAST FURNACE GRADES

	—Heavy Melting—		No. 1	—Bundles—			Machine Shop	Mixed Borings,	Short Shovel	Cast Iron
	No. 1	No. 2	Busheling	No. 1	No 2	No. 3	Turnings	Turnings	Turnings	Borings
†New York	15.33	15 33	15 33		15.33	13.33	10 33	10.33	12.33	
Philadelphia	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
°Boston	14 06	14.06	14.06	14.06	14.06	....	9.06	9.06	11.06	....
Cleveland	19.50	19.50	19.50	19.50	19.50	....	14 50	14.50	16 50	13.50-14.00
Pittsburgh	20.00	20.00	....	20.00	20.00	....	15.00	15.00	17.00	16.00
Valley	20.00	....	....	20.00	....	....	15.00	....	17.00	16.00
Mansfield	....	....	....	....	....	....	15.00	....	....	....
Chicago	18.75	18.75	....	18.75	18.75	16.75	13.75	13.75	15.75	14.75
Buffalo	19 25	19.25	19.25	19 25	19.25	....	14 25	14.25	16.25	15.25
Detroit	17.32	....	17.32	17.32	....	....	12.32	....	14 32	13.32
St. Louis	17.50	....	....	....	....	....	10.50	....	12.50	....
Cincinnati	19 50	19.50	....	19.50	19.50	....	10.50-11.00	10.50-11.00	12.50-13 00	11.50-12.00
Birmingham	17.00	17.00	17.00	....	17.00	15.00	....	....	12.00	13.00
San Francisco	17.00	17.00	17.00	17.00	17.00	9.00	7.00	....	....	....
Seattle	14.50	14.50	....	....	....	....	....	....	....	....
Los Angeles	14.00	13.00	....	12.00	12.00	....	5.50	5.50	....	....

ELECTRIC FURNACE, FOUNDRY AND SPECIAL GRADES

	Bar Crops and Plate	Cast Steel	Punchings and Plate Scrap	Electric Furnace Bundles	Heavy Turnings	Alloy Free Turnings	Cut Structural and Plate Scrap 1 ft and under	Cut Structural and Plate Scrap 2 ft and under	No. 1 Chemical Cast Iron Borings	Tin Can Bundles
Philadelphia	21.25	21.25	21.25	19.75	18.25	....	21.25	....	°16.51	....
†New York	....	....	17.33	16.33	....	....	17.33	17.33	14.33	....
°Boston	....	....	....	....	....	....	....	....	13.31	....
Cleveland	22.00	....	22.00	20.50	....	....	....	....	....	....
Pittsburgh	22.50	....	22.50	....	....	....	....	....	....	....
Chicago	....	....	21.25	....	....	....	....	....	....	....
St. Louis	....	20.00	....	....	....	....	....	....	....	....
Birmingham	15.50	....	....	....	....	....	19.00	18.50	....	....
San Francisco	15.50	15.50	....	....	....	7.00	18.00	17.50	....	14.50

STEEL GRADES OF RAILROAD ORIGIN

	No. 1 Heavy Melting R.R. Steel	Railroad Malleable	Axles	Rails — Rerolling	Random Lengths	Cut 3-ft and under	Cut 18-in. and under	Railroad Specialties	Uncut Tires	Angles, Splice Bars
Pittsburgh	21.00	22.00	26.00	....	21.50	23.50	....	24.50	....	....
Valley	21.00	....	....	....	....	....	....	....	....	....
†Chicago	19.75	22.00	....	22.25	20.25	22.25	23.50	22.75	....	22.25
St. Louis	....	22.00	24.50	21.00	19.00	21.50	....	....	21.00	21.00
Cincinnati	....	....	....	....	20.50-21.00	....	....	....	....	....
Birmingham	....	....	24.00	20.50	18.50	....	....	....	....	20.50
San Francisco	....	....	24.00	....	18.50	....	....	....	20.50	....
Seattle	14.50	....	....	....	....	....	....	....	....	....

CAST IRON GRADES

	No. 1 Cupola Cast	Charging Box Cast	Heavy Breakable Cast	Stove Plate	Unstripped Motor Blocks	Malleable	Brake Shoes	Clean Auto Cast	No. 1 Wheels	Burnt Cast
†New York	25.00	21.00	20.00	23.00	20.00	24.00	....	....	....	....
°Philadelphia	25.00	21.00	20.00	....	20.00	24.00	17.75	27.00	22.00	....
°Boston	25.00	....	20.00	23.00	....	....	....	27.00	....	....
Buffalo	25.00	21.00	20.00	23.00	20.00	24.00	17.75	27.00	22.00	17.75
Cleveland	25.00	....	20.00	....	....	....	....	....	....	....
°Pittsburgh	25.00	....	20.00	23.00	....	....	....	....	....	....
Los Angeles	25.00	....	....	....	....	....	....	....	....	....
°Chicago	25.00	....	....	....	....	24.00	....	....	....	....
Detroit	25.00	....	20.00	....	....	....	....	....	....	....
°St. Louis	25.00	21.00	20.00	23.00	....	....	17.75	27.00	22.00	17.75
Cincinnati	25.00	....	20.00	23.00	....	....	....	....	....	....
Birmingham	25.00	....	20.00	23.00	20.00	....	17.75	....	22.00	....
°Seattle	25.00	....	....	....	....	....	....	....	....	....

° Fob shipping point; † fob tracks; ‡ dealers buying prices.

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NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 14.37½c, del. Conn.; less carlots 14.50c, refinery. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 14.12½c, refinery, 20,000 lb or more; 14.37½c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 15.50c; 88-10-2 (No. 215) 18.75c; 80-10-10 (No. 305) 18.25c; No. 1 yellow (No. 405) 12.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis; high grade 9.25c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb. 0.4c; under 2000 lb 0.50c.

Lead: Common 8.10c, chemical 8.20c, corroding, 8.20c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis- St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 13.25c; No. 12 foundry alloy (No. 2 grade) 13.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 13.25c; grade 3 (90-92%) 12.25c; grade 4 (85-90%) 11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, $96-$99 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.25 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.30.

Cobalt: 97-99%, $1.50 lb, for 550 lb (bbl.); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 90.12½c per ounce.

Platinum: $91.50 per ounce.

Palladium: $24 per troy ounce.

Iridium: $125 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 14.37½c, Conn., for copper. Freight prepaid on 400 lb or more.)

Sheet: Copper 25.81c; yellow brass 23.67c; commercial bronze, 95% 26.14c, 90% 25.81c; red brass, 85% 24.98c, 80% 24.66c; best quality 24.38c; phosphor bronze, grade A 4% or 5%, 43.45c; Everdur, Duronze or equiv., hot rolled, 30.88c; naval brass 28.53c; manganese bronze 31.99c; muntz metal 26.78c; nickel silver 5% 32.38c.

Rods: Copper, hot rolled 22.16c, cold drawn 23.16c; yellow brass 18.53c; commercial bronze, 95% 25.83c, 90% 25.50c; red brass, 85% 24.67c; 80% 24.35c; best quality 24.07c; phosphor bronze, grade A 4% or 5% 43.70c; Everdur, Duronze or equiv. cold drawn, 29.82c; naval brass 22.59c; manganese bronze 25.93c; muntz metal 22.34c; nickel silver 5% 34.44c.

Seamless Tubing: Copper 25.85c; yellow brass 26.43c; commercial bronze 90% 28.22c; red brass 85% 27.64c, 80% 27.32c; best quality brass 26.79c; phosphor bronze, grade A 5% 44.70c.

Copper Wire: Bare, soft, fob eastern mills, carlots 19.89c, less carlots 20.39c; weatherproof, fob eastern mills carlot 22.07c, less carlots 22.57c; magnet, delivered, carlots, 23.30c, 15,000 lb or more 23.55c, less carlots 24.05c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 11.25c; cut sheets 11.50c; pipe 9.90c, New York, 10.00c Philadelphia, Baltimore, Rochester and Buffalo, 10.50c Chicago, Cleveland, Worcester and Boston.

Zinc Products: Sheet fob mill, 13.15c, 36,000 lb and over deduct 7%. Ribbon and strip 12.25c, 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lb 12.50c; 100-500 lb 13.00c; under 100 lb 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

PLATING MATERIALS

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 25.125c; curved, 20.375c; rolled oval straight, 19.375c; electro-deposited, 18.875c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels 20.50c.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls 34.00c, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb kegs or 275-lb bbls 18.00c lb, del.

Tin Anodes: 1000 lb and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb bbls 39.00c, fob Grasselli, N. J.; 100-lb kegs 39.50c.

Sodium Stannate: 100 or 300-lb drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	12.000	12.000	11.250
Yellow brass	9.875	9.625	9.125
Commercial bronze			
95%	11.250	11.000	10.500
90%	11.125	10.875	10.375
Red Brass			
85%	10.875	10.625	10.125
80%	10.875	10.625	10.125
Best quality (71-79%)	10.500	10.250	9.750
Muntz metal	9.250	9.000	8.500
Nickel silver, 5%	10.500	10.250	
Phos. br., A, B, 5%	12.750	12.500	11.500
Naval brass	9.500	9.250	8.750
Manganese bronze	9.500	9.250	8.750

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ⅝c for shipment of 60,000 lb of one group and ½c for 20,000 lb of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper and copper borings 11.50c; No. 2 copper wire and mixed heavy copper, copper tuyeres 10.50c.

(Group 2) Soft red brass and borings, aluminum bronze 10.75c; copper-nickel solids and borings 11.00c; lined car boxes, cocks and faucets 9.50c; bell metal 17.25c; babbitt-lined brass bushings 14.75c.

(Group 3) Admiralty condenser tubes, brass pipe 8.75c; muntz metal condenser tubes 8.25c; old rolled brass 8.25c; manganese bronze solids; (lead 0%-0.40%) 8.00c; (lead 0.41%-1%) 7.00c; manganese bronze borings, 7.25c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb, 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50c, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.75c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.95c, radiator grilles 4.95c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.80c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 lb or more of nickel or cupro-nickel shipped at one time and 20,000 lb or more of monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over 1% copper 23.00c; 90-98% nickel, 23.00c per lb nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb contained nickel, plus 8.00c per lb contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; solder sheet 18.00c.

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Sheets, Strip . . .

Sheet demand for housing loads mills; opening of first quarter books delayed by preference tonnage

Sheet & Strip Prices, Page 126

New York — While there is still heavy pressure for sheets, some larger consumers are re-checking their needs in the light of ability to get other materials, such as lead and copper, and components for their manufactured products, and it is considered likely that soon these consumers will release mills of obligations on some tonnage. A case in point is certain electrical appliance manufacturers, who are confronted by a particular shortage of fractional horsepower motors. It is believed that enameling stock and certain other sheet items will be released in the relatively near future by these manufacturers because of this shortage.

Incidentally, in relation to small motors one cause for the acute scarcity of this equipment is lack of electrical sheets. Expansion in capacity of electrical sheets was scheduled early this year for September. However, inability to obtain equipment has resulted in delay, with prospects now that enlarged facilities scheduled at three or four producing plants will not get into operation until late in first quarter.

Meanwhile, heavy pressure continues for sheets for the national housing program, especially galvanized sheets. Consequently, Washington has requested sheet producers to total the amount of rated tonnage now on their books for fourth quarter, compare it with estimated production and advise it as to the results. With this information at hand, national housing officials and CPA will review the applications for rated tonnages still not processed, with a view to approving the more urgent needs and then allocating them among producers.

To obtain a closer check on the needs of fabricators and manufacturers engaged in work for the housing program and to endeavor to facilitate them wherever necessary, the National Housing Authority has established men in various districts to keep an eye on various important operations and, in short, serve in general as expediters.

Due to the inability accurately to appraise rated demands for the fourth quarter sheet mills generally have not opened their books on hot and cold-rolled sheets and galvanized sheets for next year. There is no question, however, that no little tonnage now on books for rolling this year will be carried over into next, with a result that most producers may not have much tonnage to offer for first quarter, when and if they do formally open books for next year. Doubt, in fact, is expressed as to whether some producers will take formal action, possibly just easing into next year as requirements become increasingly pressing and as they can here and there see their way to take on more tonnage.

St. Louis — Sheet production is on the upgrade with Granite City Steel Co. now operating two of three DPC open hearths formerly idle. Third is to be pouring by the last of October. Deliveries however are still nine months behind schedule, due to a 21-week strike, and no ground is being gained. A pick-up is expected in October when the second new furnace will bring production to 50 to 70 per cent of total projected ingot capacity. The three new furnaces are of 150-ton capacity and the company's old four of 60 tons each. When a new cold rolling mill is completed, possibly in February, finished capacity will be 500,000 tons and ingot capacity 700,000 tons. Demand for sheets is unabated and some customers are reported suggesting various devices for evading price ceilings in an attempt to get delivery preference. No orders have been accepted since March and schedules are filled through second quarter. Finishing manpower is adequate and some rollers report labor efficiency is on the increase, probably due to the personal hardship of recent strikes.

Cincinnati — Sheet carryover from third quarter will be large despite a conservative fixing of original allotments. Directives and other factors upset calculations. Mills in this district are not disposed to open books for first quarter until fourth quarter schedules are more definitely set. Anxiety over scrap supplies persists.

Cleveland — Shipments of flat-rolled products in September maintained the high rate established in August and, barring any serious work stoppages, will hold at the same level in October. Carryover is not being reduced appreciably except by those producers selling on a quota basis who are applying part of each month's production on arrearages. Leading sellers in this district have resisted all offers to barter scrap for finished products, believing that the material will reach the furnaces and that they will be able to make a more equitable distribution of the finished product without a barter agreement. Demand is still pressing from consumers who have entered the metalworking field since V-J Day as well as from established customers who are attempting to keep their expanded facilities operating at a high rate. Leading interests here do not look for any easing in the sheet and strip supply until after midyear of 1947.

Philadelphia — Sheet producers generally have not opened books for next year as they still do not know where they stand. Some producers are returning orders for 1947 to the buyers while others are holding them for entry when they are able to make up schedules. In relatively few cases, as far as carbon sheets are concerned, are producers making firm commitments. However, some mills are making definite sales of stainless sheets for first quarter, although not yet to jobbers, it is understood.

Boston—Fourth quarter sheet allocations to more customers are revised and reduced, notably in galvanized. Influx of rated tonnage, involving new orders, increases and carryovers, have raised havoc with planned schedules, some of which are still not stabilized. Net result will be less tonnage than expected to industrial fabricators, previously restricted in third quarter by warehouse directive. Unless the latter is extended distributors will get less steel over the remainder of the year, but increase planned for the manufacturing trade will not materialize and distribution will be further unbalanced.

As in sheets, covering most grades and gages, consumer inventories of narrow cold strip are low and broken, which is retarding operations at more plants. Confusion and shortages are more critical than at any time in the postwar period. Government shops are having trouble getting steel without directives. Springfield arsenal has repeatedly received no response on bids for strip and this again occurred on the latest inquiry for 155 tons of low carbon, 9⅛ to 16 inches wide. Shortage of low-carbon narrow strip is critical with most users, some of whom are revising specifications to higher carbon to obtain material.

Pittsburgh—Producers state it is impossible to give customers definite delivery promises as long as overall requirements represented by CC ratings and directives are not definitely established. This makes impossible setting of definite producton schedules by many metalworking companies. CPA has asked steel producers to report total tonnage expected to be produced next quarter in hot-rolled, hot-rolled pickled and galvanized sheets. Against this expected production producers are asked to show percentage of rated orders on books as of Sept. 1. It is believed this report may be an attempt to ascertain what the industry can produce next quarter and to set against that the future tonnage CPA plans to approve.

Chicago — Manufacturing plants are more discouraged over the inadequacy of sheet distribution currently and in fourth quarter. Production of mills is at high level, but commitments are so numerous that when tonnage is fanned out it is less than required. Further to complicate the situation, sheet and stripmakers have been obliged to reduce quotas for fourth quarter in order to reduce their tremendous carryovers and to reach a more favorable position for next year. Long range estimates of reasonable balance between supply and demand run to mid-1947 and later.

Steel Bars . . .

Present bookings expected to cover most first quarter capacity; alloy bars are in early supply

Bar Prices, Page 126

New York — Cold-drawn carbon bar producers are opening books for first quarter, although in certain cases they are accepting only limited tonnages. Books are also being opened in certain quarters on hot and cold alloy bars. However, producers are still moving cautiously with respect to hot carbon bars, as they are far behind on current commitments and still do not know what they might be able to offer in first quarter. As a matter of fact, producers of small size hot carbon bars are believed generally to have enough tonnage already on books fully to engage their operations on these sizes throughout first quarter, and well beyond in certain instances.

Pittsburgh — Cold drawers report continued active demand through the full range of specifications, with heaviest requirements for sizes two inches and less. Most interests are booked into second quarter and are unable to make significant headway against order backlogs as operations continue well below capacity, due to unbalanced inventories of hot-rolled bars. Production schedules of a few parts suppliers in automotive and other industries are beginning to be

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slightly curtailed by unbalanced inventories of finished components for finished assembly. In some directions civilian goods inventory pipe lines have caught up with immediate needs, with a result that future production will be for replacement. In contrast with sheets, rated carbon and alloy bar tonnage is expected to be relatively light. Mills have not yet officially opened books for first quarter and are not expected to do so until the extent of 1946 carryover can be determined. Alloy bars are available for November shipment, while most of first quarter output is expected to be absorbed by the carryover on carbon bars, except in larger sizes.

Philadelphia—Bar sellers still have hot and cold alloy steels available for shipment in fourth quarter and some have opened books for first quarter. Also some are soliciting business in cold-finished carbon bars for next year. The situation in hot carbon bars is so complicated that producers generally are making no promises for next year, although, unquestionably, substantial business scheduled for this year will be carried over, especially in smaller sizes.

Boston — Mills with open books for next year on cold-finished carbon bars are already well through first quarter on smaller sizes and are still out of the market on special finished, turned and polished rounds and squares in these size ranges. Over 1½-inch mill schedules are not as crowded and backlogs are not as heavy. Comparison of wartime mill production with that currently in effect reflects not only heavy demand but the character of product, smaller sizes and more finishing, compared with preponderance of shell steel and larger sizes. Most bar consumers are short of stock or inventories are unbalanced and most consumers of cold-finished are closing on part of next year's requirements with suppliers who have opened books, including textile mill equipment builders, forge shops and others.

Seattle — Rolling mills are making every effort to reduce backlogs but with little success in the face of insistent demand for both reinforcing and merchant bars. Production is not as high as expected, due to labor inefficiency and abnormal turnover. Potential demand in this area is of major proportions.

Tin Plate . . .

Tin Plate Prices, Page 127

Boston — Lower percentage of tin plate earmarked for food packs in fourth quarter has in no way eased supply for industrial users of tin mill products. Demand for other forms of containers has more than filled the gap. There are some sharp reductions in tin mill quotas for fourth quarter and some industrial consumers taking small tonnages have been lopped off entirely. The Maine sardine pack is heavy and for the moment takes a large volume of plate for containers. Incidentally, tin mill demand precludes any improvement in lighter gages of sheets in other directions.

Pittsburgh — Sellers are expected to open books for 1947 with can manufacturers during October and there is no indication whether producers will apply the $5 per ton increase granted earlier this year by OPA, which was not applicable on 1946 shipments because of contract stipulations. Specifications for fourth quarter shipments closely parallel

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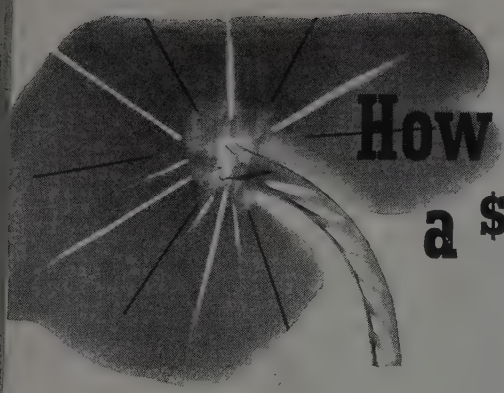

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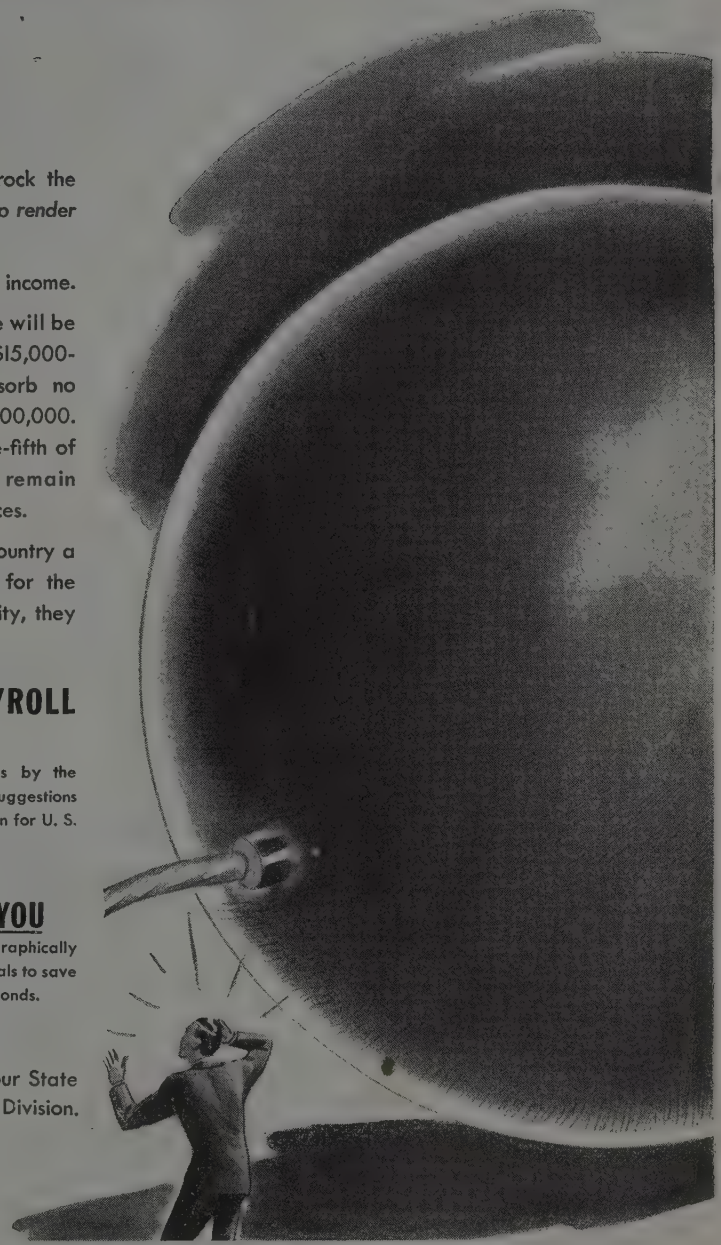

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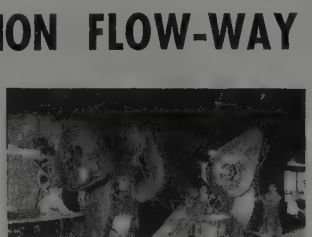

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CPA reduction in amount of tin plate to 70 per cent of monthly production for food cans and related items. Output of container items should be substantially increased as a result of more tin plate being made available for general line cans. Indicated shortage of pig tin for some months is expected to necessitate continued enforcement of most tin plate conservation measures for the remainder of the year.

Steel Plates . . .

Heavy demand puts mills further behind in first quarter obligations; raw material shortages felt

Plate Prices, Page 127

New York — Eastern plate producers are making little progress on arrearages; some in fact are further behind than a month ago. This situation, combined with orders promised for future shipment, has placed some producers in a spot where they are unable to accept any new tonnage before well into next year. At least one seller estimates that he could accept nothing, short of rated tonnage and directives, for delivery before late in second quarter.

Inquiry is widely diversified, and notwithstanding the fact that ship demand, which dominated the plate market during the war, is now relatively negligible, there is sufficient tonnage apparently to keep plate mills well engaged for some months.

Contributing to arrearages is diffculty plate producers have in obtaining raw materials, notably pig iron and scrap. One eastern mill was forced down completely during two weeks of this month and now is operating on part schedule. Certain other producers have had to limit production sharply.

Pittsburgh — A fairly large plate tonnage is involved in barge construction work in this area, notably for Jones & Laughlin Steel Corp. Fabricators have been unable to make headway against near-record order backlogs, due to continued shortage in plates. Tank manufacturers statte inadequate output of lighter gages is holding up a number of jobs. Similar reports are heard from freight car builders. Some producers have no openings for rolling until well into first quarter and in some instances are falling further behind in commitments. Overall plate demand has held up exceptionally well since the end of the war, with ship repair work continuing to absorb considerable tonnage.

Seattle — Demand for plates is steady and far beyond ability of shops which are restricted by mill allocations. Consequently they hesitate to bid on new business. American Pipe & Construction Co., Portland, Oreg., has been awarded a million gallon steel water storage tank for St. Johns, Oreg., at $117,538, second high bid but quicker completion, 9 months, is provided.

Boston — The swing to oil for domestic heating and to some extent industrially is reflected in demand for heavy sheets and indicates eventual need for increased bulk storage capacity in New England. Meanwhile demand for small tanks for gasoline and chemical storage continues high. One of the surprises in postwar demand is the continued heavy

demand for plates in view of the slackening in shipbuilding. As most mills became more crowded with orders their selectivity in order acceptance increased, with the result that a limited number of producers have become jammed with most of the straight carbon non-extra bearing tonnage. Based on promise to railroads new orders for November and December have emanated from carriers which will displace some volume.

Cleveland — Plate mill schedules for fourth quarter are about the same as for third, indicating that carryover into 1947 will be equivalent to two or three months' output. Production of lighter gage plate is restricted, due to heavy demand on continuous mills for sheet. Producers of plate ¼-inch and heavier report heavy inquiry from all classes of industrial consumers.

Philadelphia — District plate production is slightly higher than a week ago, although there is a question as to how long the improvement can be sustained in view of continued shortage of scrap. Operations are still well below normal and carryovers at the end of this quarter will range from a month and a half to four months.

Wire . . .

Wire Prices, Page 127

Chicago — Critical shortages continue to harass consumers of wire and wire products. This despite the fact that production is at high level, the difficulty being that available output must be spread broadly and therefore thinly. There is a substantial shortage of tacks for the upholstery trade. As to merchant wire products, the agricultural trade is pressing for virtually any kind of wire fabric that can be utilized for temporary storage of corn.

Boston — Another producer normally supplying this district with a fair volume of rods, notably screw stock grades, is withdrawing from the Worcester base after completing delivery on present commitments and similar action on drawn wire is under consideration. This will further tighten rod supply, already critical with nonintegrated producers. Fourth quarter quotas have been reduced in other cases and with rod production in this district largely absorbed by integrated plants. Others are operating on a day-to-day supply with schedules frequently revised. Some Swedish rods are coming in and are readily taken but for most tonnage scheduled this grade is too high. Demand for substantial tonnage of low-carbon stock is not being filled. Overall fourth quarter quotas to consumers will provide no increase in tonnage for most.

Tubular Goods . . .

Tubular Goods Prices, Page 127

Boston—Several large steel pipe inquiries, deliveries to start in third quarter next year and involving 20,000 tons, are going begging. On direct shipments mills are booked beyond midyear and are reluctant to become committed on large tonnages beyond. Distributors are getting quota shipments on a monthly basis and stocks are taxed to meet contractors' requirements and other large orders which normally would go to producers. To expedite deliveries distributors are urged to specify a minimum number of

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sizes in a carload, four to six if possible. Utility orders for 1947 have been returned in some cases. Industrial consumers of tubing are being forced to improvise grades and sizes and electric tubing now is about as extended as other grades. Stainless is in somewhat better position than most. Demand for boiler tubing is active and electric welded has tightened as facilities are crowded with increased orders for mechanical tubing. Cast pipe foundries are quoting up to 12 months on delivery, though there are exceptions.

Seattle—Inquiry for cast iron pipe has declined but this is attributed to difficulty of obtaining definite delivery dates. As soon as producers can step up output agencies look for active business as demand for water improvements is wide-spread in this area. Vancouver, Wash., has awarded 300 tons of 4 and 8-in. cast iron pipe to H. G. Purcell, Seattle.

Structural Shapes . . .

Structural Shape Prices, Page 127

New York — Structural demand continues to shrink as a result of CPA limitations on nonhousing construction. However, a few sizable jobs are being placed, including 1000 tons for a research laboratory for the General Electric Co., Schenectady, N. Y., awarded to Lehigh Structural Steel Co., Allentown, Pa., and some scattered tonnages of fair size are being figured. Meanwhile, fabricating shops are still booked far ahead and shape mills have a heavy tonnage on books, much of which undoubtedly will carry over into next year.

Boston—Drastic reductions in nonhousing construction, postponements and delays in some projects previously under contract, coupled with high costs, may contribute toward easing demand on structural mills sooner than expected, possibly in first quarter on some sizes. To date, however, pressure for structural shapes is unabated and is emphasized by the overbalanced ratio of smaller sizes, or more pieces per ton, a situation prevalent in backlogs of most heavier tonnage steel products. Not one bid was submitted for 223 tons of steel angles for the Federal Prison Industries, Lewisburg, Pa. The outstanding award is 17,000 tons for a generator building for General Electric Co., Schenectady, N. Y., placed by a Boston engineer-contractor. Bridges pending approximate 1100 tons, including 250 for the New York, New Haven & Hartford at New Haven, Conn. For a plant addition at Springfield, Mass., Smith & Wesson want 500 tons.

Chicago—No new inquiry of note has come before the structural trade recently. Awards also are light, and represent for the most part jobs figured some time ago. All fabricators appear to be overcommitted in view of the tonnage of plain shapes they are obtaining from mills. The problem now is to obtain enough material and in proper sizes to complete jobs in progress. Some claim they are not looking for new business before 1947.

Seattle — Fabricators are making the best of a bad situation. Inventories at extreme low, mill allocations far below needs, transportation interrupted and much material delay en route, due to the seamen's strike, are some of the current factors. In some instances fabricators have assumed the added freight cost of one cent a pound over water, to bring their steel by rail in order to meet contract requirements. Some plants are likely to shut down soon unless conditions improve, Isaacson Iron Works, Seattle, is fabricating about 300 tons shapes for a paperboard mill at Bellingham, Wash. Whatcom county, Wash., plans a 120-foot steel span, H. M. Hadley, Bellingham, engineer.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 127

Boston — Concrete reinforcing bar sellers are reluctant to commit ahead on larger tonnages in view of the limited nearby stocks and uncertainty as to production to be available in the next few months. Most distributors have one or two substantial tonnage projects but beyond are conservatively spreading out bars in smaller lots. Especially short are ⅜ and ½-inch. Delivery of August allotments was a month late in some instances. Contractors notably have difficulty in placing requirements. The largest contract includes 1200 tons for a telephone building in Boston, let to Bethlehem Steel Co., Bethlehem, Pa.

Chicago — Reinforcing steel suppliers are operating at a low level of activity, by necessity for lack of adequate supply of material. Although new inquiry is not large, it arouses no interest, and few suppliers show interest in figuring. All interests are overcommitted and explain that it will be early next year before they will be in a position to take new work involving much tonnage.

Pig Iron . . .

Effect of premiums on excess production slow to affect output; scrap and coke shortages a factor

Pig Iron Prices, Page 129

Pittsburgh — Volume of certified tonnage scheduled for October shipment is not expected to be definitely known until Oct. 1. Rated order obligations of the merchant iron producer here probably will not be altered much for next quarter, however, for this interest has a relatively small tonnage originating from agricultural equipment builders. Soil and pressure pipe requirements are expected to continue large through the remainder of this year. Pig iron production undoubtedly will be substantially increased by the premium payment plan. However, scarcity of coke and scrap may prove the major stumbling block in preventing an attainment of the optimistic production estimate of the housing administration. Shortage of scrap is expected to prevent integrated steel producers from taking over basic pig iron tonnage commitments of merchant furnaces, despite a bait of $2 per ton, while scarcity of coke and ore probably will delay relighting of some idle stacks.

New York — Pig iron melt here for September will be lighter than in August, due in part to the trucking strike and also the seamen's walkout, which latter

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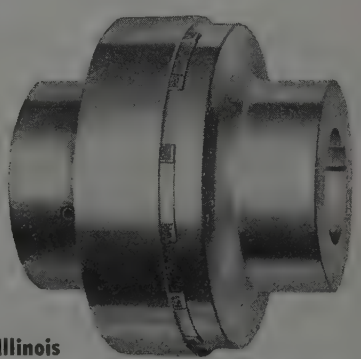

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imposed heavy rail embargoes during the greater part of the month. With these particular labor troubles diminishing, however, the outlook for October is more encouraging and it is thought also that later in the fall shipments here will reflect increased pig iron production resulting from the new price incentive program announced by Washington, even though foundries engaged in work for the housing program and in the production of brake shoes, on which preference is being given, are not as numerous as in certain other districts.

Meanwhile, foundrymen complain about the shortage of coke, as well as of pig iron and scrap.

Cleveland — Government's premium price plan was well accepted by producers in this district, who believe that it will result in a higher rate of production soon. Blast furnaces here, however, were operating at close to capacity prior to announcement of the plan. Foundries in this district are receiving sufficient pig iron to maintain operations but are critically short of scrap. Some foundries have reduced the work-week and are operating on a day-to-day basis, being entirely dependent upon scrap deliveries.

Philadelphia—Poor coking coal is limiting pig iron production at various furnaces. One eastern producer estimates his output is off 15 per cent as a result. Merchant iron consumption was up slightly this month, because of the amount of preference work being done for the housing program, with expectation it will be even higher in October as the price incentive program becomes more effective.

Boston — Not before December will production by Mystic furnace ease the stringent shortage of foundry iron in New England and initial output will be spread thin. There is a rush to get on books of this Everett, Mass., stack but no firm orders can be accepted until the extent of rated volume is ascertained and first production will be malleable. Current ore supply is not beyond three months at capacity and must be supplemented and probably delivered all rail. Meanwhile foundries without ratings need iron badly. Some are down or curtailing and lack of castings is felt by several industries. Furnace schedules for October are delayed by extension of authorizations to purchase iron for housing products to Sept. 30, with producers being required to accept such orders up to Oct. 5. Minimum shipments of 45 tons per car exceed the allocations of some small foundries, while two cars, 90 tons, exceeds that of others, but few are getting all the iron needed in the unrated group. Iron covered by ratings was delivered fully in September but there are carry-overs involving tonnage not under priority.

Cincinnati — Pig iron producers have not yet announced allotments of tonnage for October. These may be similar to September shipments, which sustained the melt at a fair level but considerably lower than earlier in the year. Shipments have been steady, a factor in avoiding shutdowns, as the stocks of most melters are close to exhaustion.

St. Louis — Pig iron supplies are considered adequate, although ground stocks are a thing of the past. Melters making certified products are in the minority and are in fair condition for iron. Those in uncertified production are beginning to suffer and there have been instances in which melters with fair supplies have aided others. Foundries are still extremely low but anticipate relief soon under the foundry iron price increase. Several mills and virtually all foundries could increase production with better iron stocks, although manpower and scrap are still a deterrent to the latter. The premium price incentive plan is expected to improve outside shipments into St. Louis after a time, but local furnaces already are operating at presumed top capacity. Some iron distributors complain that the volume of certifications is forcing them to cripple seriously old established customers.

Chicago—Pig iron supply took a more promising outlook last week in connection with Inland Steel Co.'s offer as sole bidder for the blast furnace plant it built for the government during the war and has operated since. In connection with acceptance of its offer to purchase or lease, Inland agreed to furnish to the housing program so long as the subsidy is effective between 20,000 and 24,000 tons of merchant iron monthly. This would be a big help in relieving foundries now operating on short supply under allocation. Foundries also continue to suffer from lack of cast scrap, the recent increase in ceiling having failed to bring out this grade in measurably larger volume.

Buffalo — Lack of ore and coke probably will make it impossible for this area to share in the government's premium price program for additional pig iron production. Local producers need still more ore to meet conditions of the program.

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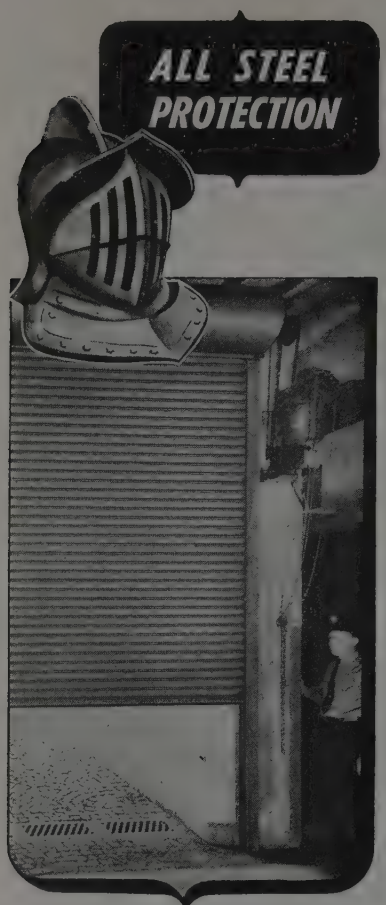

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One interest with an idle high-cost stack reports need for 180,000 tons of ore additional to make it worth while to resume. Another producer claims capacity operations are threatened by lack of coke. No improvement is noted in the tight iron situation as foundries press for deliveries. Labor shortages are also felt in some instances.

Scrap . . .

Impasse continues as yards limit collection and shipment; little hoarded scrap comes out

Scrap Prices, Page 130

Pittsburgh — Scrap movement to consumers has shown little improvement since the OPA announcement denying a price increase. Dealers released some tonnage held back pending the price decision but these shipments have been well below expectations and it is pointed out that most dealers are not collecting and processing material on a large scale under present price regulation. A slight increase in shipments of cast scrap has been noted but consumers state upgrading is more prevalent, with considerable inferior tonnage being shipped as clean blocks carrying the $7 per ton advance. Producers of billet, bloom and forge crops have stopped shipment and canceled existing orders as these grades no longer carry the $5 per gross ton differential over heavy melting steel. This high quality scrap is considered essential in production of tool steel, die blocks and other specialties.

A group of electric furnace and acid open-hearth steel producers is seeking to have this high quality scrap reinstated as a separate classification at the former differential. Additional steel producers have obtained CPA approval, on the basis of critically low inventory position, to purchase electric furnace and foundry scrap for open-hearth use.

An industry advisory committee meeting is scheduled for Oct. 1 to discuss scrap allocations and methods of speeding up collection efforts, with special emphasis on the ship-breaking program and a drive for farm scrap.

Detroit — Considerable disappointment has followed in the wake of new scrap controls announced by OPA and CPA. It is felt they are unrealistic and will be difficult to enforce, further delaying return to a free and open market on which availability of material depends.

Following clarification of Washington action, some improvement was noted in shipments, but there has been no excessive stocking of material in dealers' yards. Practically all production scrap is channeled to specific mills, resulting in some of the most abnormal crosshauling and remote shipping this area has ever witnessed.

Issuance of open orders to a number of mills to use premium grade scrap in open hearths appeared to nullify regulations against use of this material, and brokers are wondering what use the restriction can serve.

Terrific pressure continues on scrap sources from foundries, but cast scrap is just as hard to obtain as ever. Some hope is seen in the extension of subsidy payments to merchant blast furnace interests, idle because of high-cost operations, but it will be several months before the effect of this tonnage will be felt appreciably.

Automobile companies are appealing to their dealer organizations to assist in local efforts to get scrap moving to yards, but in the absence of the patriotic flavor of wartime scrap drives, it is not believed much help will be forthcoming on this score.

St. Louis — Scrap shipments have improved perhaps 10 per cent since the recent OPA price ruling, but the prospect of further improvement is regarded as bad. There is no sign of any general movement of hoarded metal from collection points. Previous estimates of tonnage so immobilized are being revised downward. Mill reserves still average 30 to 45 days, but pressure on brokers is increasing. Foundry stocks are improving since open hearths have been forbidden to buy foundry grades. Railroad scrap is in easier supply, though not plentiful. All prices remain at ceiling.

Cincinnati — Movement of iron and steel scrap has declined still further. Steelmakers are eating further into reserves to maintain present production, reversing the usual trend at this season, augmenting of inventories at the approach of winter. Undoubtedly resentment over OPA price announcement has dulled collection interest.

Seattle—No improvement is reported in the steel scrap market. Expected movement from the interior following OPA decision to peg present ceiling prices has not developed although mills are hopeful the situation will be eased. Meanwhile receipts are small and plants are constantly dipping into inventories. Some help is expected when the government's program of scrapping obsolete ships gets under way, but this will require several months.

Boston—Offering of some 5500 tons of government-owned scrap, including accumulations, has perked up sales but movement of steel scrap is still retarted, with dealer stocks heaviest in a long period in a few cases. Exercise of inventory controls and their possible effect on some holdings commands interest. What effect shipbreaking will have directly in this area is conjectural but in any event no immediate relief is likely. What improvement is apparent in steel scrap shipments is largely in low phos to the Pittsburgh district. Supply of cast is limited most of the loose tonnage having been bought at overceiling prices during the OPA recess.

Cleveland—Little betterment is evident in scrap supply except in the case of electric furnace operators who are receiving practically as much as they need for current operations. Larger open-hearth operators have permission to use low phos scrap in their furnaces according to an allotment, thus releasing some tonnage for electric furnaces. Steelmakers in general are operating on small inventories and are pressing for additional tonnage, which is difficult to obtain. Cast scrap is a trifle freer and is aiding foundries to eke out small pig iron supply, though the increase in offerings is less than had been expected when higher prices were authorized.

Philadelphia—Scrap shipments show little or no improvement. Eastern consumers are beginning to follow the lead of Pittsburgh and central western consumers in applying for government ap-

proval to buy low phos for basic open-hearth use. Demand for this grade is reaching a point well in excess of supply. Upgrading at certain points appears worse than at any time, but even if this were true flow of scrap is far below consumer requirements.

Chicago—Flow of scrap is only slightly better than recently, but sentiment for the future is more optimistic. It would appear that material held back by the recent hope of higher ceilings is being released and is just now reaching the market. With steel flowing to consumers plants in better volume, scrap production is bound to increase. The real test will come with cold weather, however, when day by day receipts are interfered with. No steelmaker or foundry is able to do much better than keep even with consumption, and inventories are needed for fall and winter.

M. S. Kaplan has submitted an apparently high bid of $1,937,99 for scrapping the U.S.S. Wilmette, formelry the Eastland, a Great Lakes passenger carrier.

Buffalo—Indications that the new OPA regulations may meet plenty of resistance and criticism were seen as many complaints were heard over permission granted to a leading open-hearth operator, with a fair reserve stock, to purchase low phos scrap. Pessimism over winter stockpiles continues, but two mills reported holding their own on recent shipments. Dealers, however, find yard receipts again have reached a low ebb following the recent movement of material that was accumulated during the price waiting period. Another boatload of 5000 tons arrived during the week from the Duluth area.

New York—Lipsett Inc., 80 Wall St., New York, was high bidder Sept. 25 on the steamship Normandie, now at Brooklyn Navy Yard, with $161,680. There were four bids in all, with Boston Iron & Metals Co., Baltimore, offering $125,000; Patapsco Scrap Metal Corp., Baltimore a Bethlehem subsidiary, $63,070; and Newport News Ship Building and Dry Dock Co., Newport News, Va., $25,000. The Maritime Commission is expected to act on these bids at once. The ship represents potentially 35,000 tons of scrap.

Movement of scrap from this district continues light, due principally to poor collections. Some Pittsburgh mills, having gained permission to use low phos in basic open hearths, are drawing on such tonnage here.

Warehouse . . .

Warehouse Prices, Page 128

Philadelphia—Some district jobbers report September the most active month so far this year, although opinion varies as to the outlook for the remainder of 1946. Some distributors believe incoming mill shipments will be sustained in fourth quarter, notwithstanding expiration of Direction 13 on Sept. 30, while others look for an appreciable drop. Should there be a decline in mill shipments jobber business will decline, they believe.

Cleveland — Receipts of steel products by warehouses from mills during September were smaller than in the preceding month and likely will show a further decline during October. Some mills have set back validated orders for the fourth quarter to the first quarter of next year while some have been canceled entirely. One large warehouse here, far instance, has been informed that it will not receive shipment of certain small rounds and flat bar stock that had been promised for December until April at the earliest. Warehouse stocks of structurals, sheet, strip and bar size angles are depleted with demand most pressing in those items. Alloy steel supplies are somewhat easier but even in this classification cold-finished grades are scarce. Volume of rated orders received in this district has been small.

Chicago — Heavy volume of demand and inadequate steel supply provide a terrific handicap for steel warehouses. Unable to get sufficient steel from mills, consumers shop around. This situation keeps stocks at a low level and heavily unbalanced as material moves out about as rapidly as it is received from mills.

Rails, Cars . . .

Track Material Prices, Page 127

Philadelphia — The Pennsylvania railroad has closed bids on 200,000 tons of rails for 1947. It will also require about 20,000 tons of tie plates, 5000 to 6000 tons of angle bars, plus spikes and bolts. For the current year this road placed 175,000 tons of rails, plus accessories, although the full amount will not be delivered, it is understood.

Seattle — Railroad supply houses report an active demand from the Philippines for rails, cast steel parts and other items for railroads, logging roads and plantation transportation. Complete dry kilns for the lumber industry are also being shipped. Destruction by the Japs, it is reported, was so great that it will be several years before plants are rehabilitated. Light weight rails are being exported in considerable volume.

Iron Ore . . .

Iron Ore Prices, Page 128

Consumption of Lake Superior iron ore in August reached 6,738,409 gross tons in the United States and Canada, compared with a revised total of 6,460,033 tons in July and 5,658,278 tons in August last year, according to figures of the Lake Superior Iron Ore Association, Cleveland. The August figure was highest since May, 1945. Cumulative total for this year to Sept. 1 was 37,440,730 tons, compared with 52,536,854 tons in the comparable months last year.

As of Sept. 1 stocks of ore at furnaces and on Lake Erie docks totaled 34,066,987 tons, compared with 34,781,382 tons at the same date last year. Active blast furnaces in the United States depending principally on Lake Superior ore numbered 163 as of Sept. 1, compared with 166 a month earlier and 146 a year earlier. Three Canadian furnaces were active Sept. 1, compared with one a month earlier and six a year earlier, showing some gain from the strikebound conditions of summer.

Number of Great Lakes vessels in the ore trade Sept. 15 was 262, compared with 257 as of July 15 and with 247 as of Sept. 15, 1945, according to statistics of the M. A. Hanna Co., Cleveland. No report for Aug. 15 was made, on account of the maritime strike then in effect.

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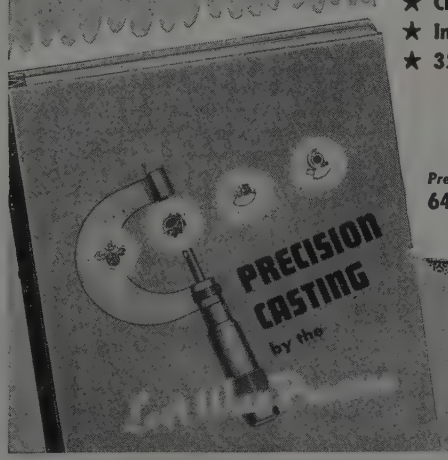

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Nonferrous Metals . . .

Nonferrous Prices, Page 132

New York — Although OPA has been advised that flow of copper and copper scrap is being slowed by withholding for a higher price adjustment, that agency announces no increase in present ceilings on primary and secondary copper, copper scrap, copper base alloy scrap or brass mill scrap is planned for the near future.

This statement was designed to end price uncertainties. OPA is also studying its inventory controls over copper and will now allocate copper and copper base alloy scrap sales by the Army, Navy and Maritime Commission. Owning agencies no longer will declare this scrap as surplus, but will sell direct. Lots under five tons may be sold in the open market.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7500 bearing piles for generator building for General Electric Co., Schenectady, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Stone & Webster Engineering Corp., Boston.

1000 tons, research laboratory, General Electric Co., Schenectady, N. Y., through George A. Fuller & Co., New York, engineers, to Lehigh Structural Steel Co., Allentown, Pa.

1000 tons, factory building, Bellwood, Ill., for Chicago Screw Co., to American Bridge Co., Pittsburgh.

670 tons, woolen mill, Dublin, Ga., for C. M. Guest & Sons, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, plant, Allen Industries, Rahway, N. J., through Walter Kidde & Co., New York, to Lehigh Structural Steel Co., Allentown, Pa.

400 tons, state bridge, Northumberland County, Pennsylvania, to Phoenix Bridge Co., Phoenixville, Pa.

325 tons, building, Orange, Tex., for E. I. du Pont de Nemours & Co. Inc., to Virginia Bridge Co., Roanoke, Va.

300 tons, paperboard mill, Bellingham, Wash., to Isaacson Iron Works, Seattle; Howard S. Wright, Seattle, general contractor.

120 tons, Cedar river bridge, Covington, Iowa, for Chicago, Milwaukee, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh; bids June 5.

STRUCTURAL STEEL PENDING

5000 tons, addition, Waterside Station, Consolidated Edison Electric Co., New York City, pending.

1750 tons, women's dormitories, Penn State College, State College, Pa.; bids Sept. 24.

1700 tons, reconstruction of bridge A-307, Redlands, Calif., for Kansas City Southern Railroad.

1000 tons, store building, Allied Stores Inc., St. Petersburg, Fla., pending.

835 tons, steel girder viaduct on Wilbur Cross Parkway, at Hamden, Conn.; bids Sept. 30.

500 tons, plant for Smith & Wesson, Springfield, Mass.

500 tons, Sands Apartment, Norfolk, Va., bids asked.

350 tons, highway span, Austin, Tex., for state highway commission.

310 tons, power house, Kankakee, Ill., for state hospital; John Moroff & Son, Kankakee, Ill., low on general contract; bids Sept. 12.

300 tons, alterations to bus terminal, Omaha, for Interstate Transit Co.

250 tons, bridge for New York, New Haven & Hartford railroad in Cedar Hill district, New Haven, Conn.

125 tons, Sharples laboratory, Bridgeport, Pa.

100 tons, state bridge, Snyder county, Pennsylvania; bids closed.

Unstated tonnage, steel warehouse, Bureau of Reclamation, Denver; National Iron Works, San Diego, Calif., low $60,971 fob; traveling cranes, Columbia Basin project, Cyclops Iron Works, San Francisco, low $210,665; steel structures, Gila substation, Parker dam project, Tulsa Boiler & Machinery Co., Tulsa, Okla., low $29,459 fob destination.

Unstated, 120-foot steel span, Whatcom county, Washington; H. M. Hadley, Bellingham, engineer.

REINFORCING BARS . . .

REINFORCING BARS PENDING

200 tons, state road work in Gloucester county, New Jersey; bids Sept. 24.

Unstated, office building, Chicago, for Scott Foreman & Co.; bids Sept. 27.

PLATES . . .

PLATES PLACED

Unstated, million-gallon steel water reservoir, Portland, Oreg.; American Pipe & Construction Co., Portland, Oreg., general contract, at $117,538, completion 9 months.

PIPE . . .

CAST IRON PIPE PLACED

975 tons, 24-inch, Springfield, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

300 tons, 4 to 8-in. for Vancouver, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

1100 tons, 12 to 24-inch, two openings, Metropolitan district at Hartford, Conn.; United States Pipe & Foundry Co., Burlington, N. J., only bidder.

370 tons, 6 to 16-inch, Providence R. I.; bids in.

150 tons 8-inch, Kingston, Mass.; bids in.

110 tons, 16-inch, York Water district, Maine Turnpike Authority.

RAILS, CARS . . .

RAILROAD CARS PLACED

Atchison, Topeka & Santa Fe, 750 fifty-ton box cars, to General American Transportation Co., Chicago; these are in addition to 1000 previously noted as placed with its own shops.

Chicago, Burlington & Quincy, 2200 freight cars, to own shops at Lincoln Nebr.; includes 1000 allsteel hoppers, 800 steel-sheathed box cars, 200 steel frame stock cars, 100 steel-sheathed parts cars and 100 steel flat cars.

Pennsylvania railroad, 1000 high-tensile box cars, to own shops at Altoona, Pa.; 100 cars are 60-foot inside length and 1000 are 50-foot inside length.

RAILROAD CARS PENDING

Atchison, Topeka & Santa Fe, 250 fifty-ton box cars, bids asked; these are in addition to 750 recently placed with the General American Transportation Co., Chicago, and 1000 noted a short time prior to that as being placed with its own shops.

Lehigh Valley, 500 fifty-ton box cars and 100 seventy-ton drop end gondola cars, bids asked.

Union Pacific, 1000 seventy-ton ballast cars, bids asked; this was noted in last week's issue, but work as to additional cars also noted at the time as pending for this railroad was in error.

LOCOMOTIVES PLACED

Chicago, Burlington & Quincy, 17 diesel locomotives, to Electro-Motive Division of General Motors Corp., La Grange, Ill.; includes six 6000-horsepower freight, three 4500-horsepower passenger, two 4500-horsepower freight, five 4000-horsepower passenger and one 2000-horsepower passenger.

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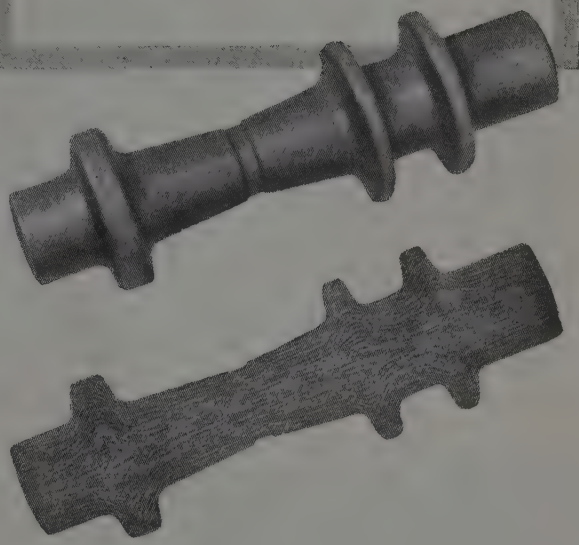

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Circuit Court Upholds Basing Point Pricing

(*Concluded from Page* 34)

plant basis.

"In our judgment, the question as to whether the basing point price system should be declared illegal rests clearly within the legislative domain. We know of no criticism so often and so forcibly directed at courts, particularly federal courts, as their propensity for usurping the function of Congress. If this pricing system which Congress has over the years steadfastly refused to declare illegal, although vigorously urged to do so, is now to be outlawed by the courts, it will mark the high tide in judicial usurpation."

Another feature of the pricing system under attack by the Commission was that certain mills are recognized as price leaders. As to this contention by the Commission, the Court stated, "We would think that in all forms of industry, particularly those of great magnitude, irrespective of the pricing system employed, that there would be found price leaders and price followers. We would suppose further that the leaders are those who occupy a commanding position, perhaps because of their size and strength, and that the followers would be those of less vitality." Citing unreversed decision of the United States Supreme Court in the International Harvester Co. case and the Standard Oil Co. case, the Court said, "It has been held that one may follow the price leadership of another without imposing any restraint on competition."

Among other practices which the Commission attempted to order stopped, was that of using freight rate books published by the Cement Institute, showing freight rates to various destinations from various points of production. The Court held that the issuance of such freight rate books was within the legal sphere of trade association. Further quoting, "In order to determine the delivered price, there must be added to the factory price of a given manufacturer, the cost of transportation to the point of delivery. Prompt quotation of a delivered price therefore involves the ability to carry out promptly the mechanical process of adding to the mill price, the cost of transportation to the point of delivery. Lists of freight rates, in convenient and readily available form, are therefore necessary adjuncts to the quotation of delivery prices for cement."

The Court affirmed it as its view that cement makers who have their own base mill and make a price predicated solely on such a basis, are following "a trade practice or policy essentially different from the nonbase mill which predicates its price upon some other base than the point of actual shipment."

Reviewing the FTC's point that cement is sold at all points of destination at an identical price, and particularly that bids to the government have oftentimes been made in identical amounts, as proof of Commission charges that a combination exists within the industry, the Court pointed out that the alleged combination is the "employment of the basing point method which results in identical delivered prices. We think we have heretofore demonstrated that the same result would ensue as the result of any pricing method and whether used individually or in combination."

In his dissent, Judge Evans emphasized the limitations of an intermediate court like the Circuit court of Appeals. He held that practice of charging "phantom" freight, at least where such charges are substantial, is illegal.

Distributors Assail WAA Tool Disposal Policies

(*Concluded from Page* 41)

with "waging the battles of yesterday." Officials still confuse monopoly with size—they fail to realize that a big country such as ours must have big business.

At the annual dinner of the association, Honorary Member Wm. F. McCarthy bestowed citations and wrist watches upon A. G. Bryant, president, Bryant Machinery & Engineering Co., Chicago, and A. B. Einig, general manager, Motch & Merryweather Machinery Co., Cleveland, in recognition of their outstanding machine tool industry efforts during the war.

Mr. Einig, retiring after two terms as president of the Association, gave a vivid account—in the Burton Holmes manner—of his 76-day trip around the world as machine tool expert on Ambassador Edwin Pauley's reparations mission. In Mr. Einig's day-to-day moving picture record of the trip were a number of "flashes" of Earl Shaner, editor-in-chief of STEEL, in his capacity as iron and steel industry specialist with the mission.

In closing the convention, the newly elected president of the association, George Habicht Jr., president and general manager, Marshall & Huschart Machinery Co., Chicago, urged that young men of the machine tool building and distributing industries take more active part in the activities of the respective associations. Also, he urged that young graduate engineers be encouraged to seek their fortunes in machine tool building and selling, "because we now are in a young man's world."

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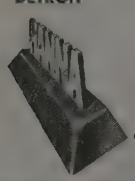

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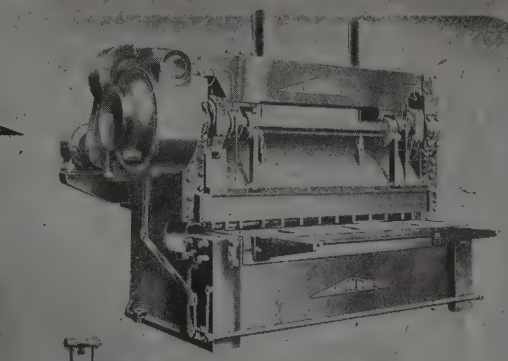

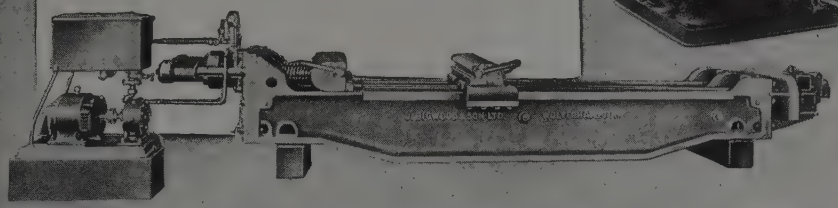

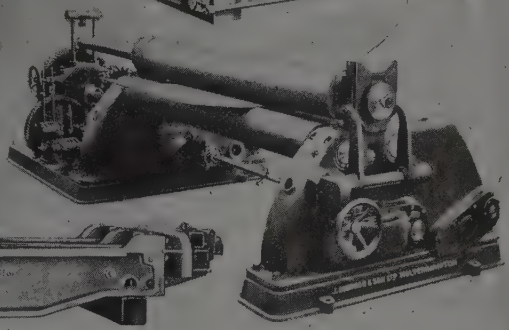

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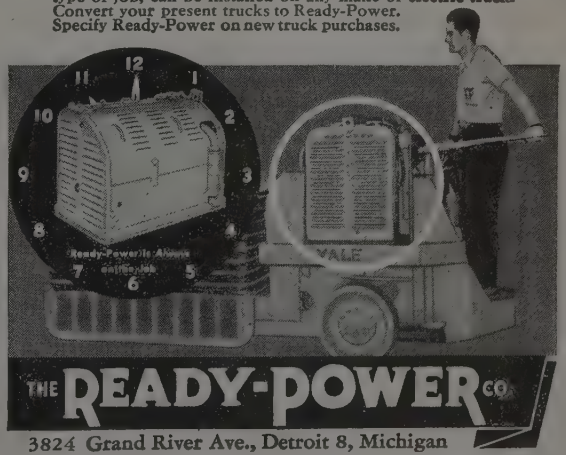

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CONSTRUCTION AND ENTERPRISE

CALIFORNIA

BURBANK, CALIF.—Pacific Airmotive Corp., 6265 San Fernando Rd., Glendale, Calif., has CPA approval for three test buildings 62 x 65 feet, to cost $90,000.

BURBANK, CALIF.—Burbank Metals Inc. has been incorporated with $200,000 capital by Ernest B. Eklund and associates, represented by John M. Schwartz, 215 West Seventh St., Los Angeles.

EL SEGUNDO, CALIF.—Selenium Corp. of America, 1719 West Pico Blvd., plans a one story plant to cost about $200,000. A. F. Schmidt, 777 East Washington Blvd., Los Angeles, is consulting engineer.

LOS ANGELES—Borrmann Steel Co. has been incorporated with $100,000 capital by George H. Borrmann and associates, represented by Hazard, Reine & Holland, Beverly Hills, Calif.

LOS ANGELES—American Metal Products Co., 2310 Griffith Ave., has building permit for a plant building at 2911 South Compton Ave., 50 x 130 feet, to cost about $50,000.

NEWARK, CALIF.—Leslie Salt Co., 310 Sansome St., San Francisco, has let contract to Austin Co., 618 Grand Ave., Oakland, Calif., for a salt processing plant, including conveyor system, to cost about $500,000.

OAKLAND, CALIF.—Shasta Pump Co., 792 22nd St., Oakland, has let contract to Elder & Owens, 2206 Encinal Ave., Alameda, Calif., for a one-story manufacturing plant in East Oakland, to cost about $200,000.

RICHMOND CALIF.—American Radiator & Standard Sanitary Corp., Critchett and Essex Sts., Richmond, is having plans prepared by Prack & Prack, 130 Federal St., Pittsburgh, for a manufacturing plant addition covering 200,000 square feet of floor space, costing about $2,500,000.

SAN FRANCISCO—Crown Cork & Seal Co., Potrero and 25th St., has plans by A. F. Roller, 1 Montgomery St., San Francisco, for a one-story 600 x 600-foot plant and office building to cost about $1,750,000.

SOUTH GATE CALIF.—Acme Blower & Pipe Inc., 5419 Tweedy Ave., has building permit for a plant building to cost about $20,000.

FLORIDA

MIAMI, FLA.—Florida Power & Light Co., Ingraham Bldg., plans an addition to its generator plant, to cost over $500,000.

PORT INGLIS, FLA.—Florida Power Co., St. Petersburg, Fla., has let contract to R. E. Carlson Inc., St. Petersburg, for a power plant, to cost over $200,000. White Engineering Co., 16 Hudson St., New York, is engineer.

GEORGIA

COLUMBUS, GA.—Columbus Iron Works has let contract to Murphy Pound Construction Co. for construction of a plant building to cost about $90,000. CPA approval has been obtained.

MONTEZUMA, GA.—Montezuma Welding & Radiator Works, is erecting a machine shop and welding shop 40 x 60 feet.

ILLINOIS

CHICAGO—Leischen-Sobel Steel Co., 4914 Wentworth Ave., plans a one-story 60 x 200-foot building, contract to Poirot Construction Co., 2001 West Pershing Rd., estimated to cost about $200,000.

CHICAGO—Vesicol Corp., 120 East Pearson St., has let contract to C. Rasmussen Corp., 1448 West Adams St., for a three-story 86 x 194-foot factory and laboratory building to cost about $500,000.

HILLSIDE, ILL.—Chicago & North Western Railroad Co., E. C. Vandenburgh, 400 West Madison St., Chicago, will let contract soon for a one-story 82 x 187-foot wheel shop. Plans are by DeLeuw, Cather & Co., 20 North Wacker Dr., Chicago, are engineers.

MARYLAND

BALTIMORE — Rheem Mfg. Co., Sparrows Point, Md., has let contract for a plant addition to cost about $100,000, completing an expansion program. Company fabricates steel barrels, tanks, water heaters and similar products.

BALTIMORE—Joseph E. Lewis Co. Inc., 1303 Carroll St., manufacturer of heat exchangers and reclaimers, tube bending and coiling, is adding a second story to its plant, adding 14,000 square feet. Joseph E. Lewis is president.

BALTIMORE — Bendix Radio Division of Bendix Aviation Corp., Towson, Md., is adding a 50,000-square foot manufacturing building as part of its expansion program, which has included a 28,000-square foot machine shop and 10,000-square foot addition to main manufacturing building.

MASSACHUSETTS

CAMBRIDGE, MASS. — Cambridge Steam Corp., 384 Western Ave., plans a steam-electric power plant to cost about $3 million. Gilbert Associates Inc., 412 Washington St., Reading, Mass., is consulting engineer.

MICHIGAN

DETROIT—Hudson Motor Car Co., East Jefferson Ave., plans a one-story plant addition costing about $300,000.

DETROIT—Floodbeam Inc., 1041 Perry St., has been incorporated with $1 million capital to manufacture flash lights, spotlights, parts and accessories, by George A. McCune, 8875 Dumbarton Rd.

DETROIT—Tompkins Products Inc., 1040 West Grand Blvd., has been incorporated with $50,000 capital to manufacture machines, machine products and parts, by Charles S. Tompkins, 70 Highland Ave., Highland Park, Mich.

DETROIT—Mel-B. Ben Tool & Mfg. Co., 2648 East Fort St., has been incorporated with 5000 shares no par value to manufacture tools dies, jigs and fixtures, by Jay T. Black, 4100 Balfour Rd.

DETROIT—Lafayette Press Co., 3760 East Lafayette, has been incorporated with $50,000 capital to manufacture presses and metal work, by John Green, 575 Lakeland Ave., Grosse Pointe, Mich.

DETROIT—C. J. Right Steel Products Inc., 1758 West Jefferson Ave., has been incorporated with $25,000 capital to manufacture gas burners and screw products, by Cass J. Right, 8140 Montlieu St.

EAST DETROIT, MICH.—Ueber Tool & Mfg. Corp., 13125 East Eight Mile Rd., has been incorporated with $150,000 capital to manufacture tools, by Herman J. Ueber, 11951 East Outer Dr., Detroit.

FERNDALE, MICH.—Commando Tool Co., 21721 Republic Ave., has been incorporated with $200,000 capital to operate a tool and die shop, by Patrick Smith, same address.

IRONWOOD, MICH. — Ironwood Trailer Coaches Inc., 105 Roseburgh Bldg., has been incorporated with 5000 shares no par value to manufacture trailer coaches, by Charles H. Becker, same address.

MONTANA

ANACONDA, MONT.—Anaconda Copper Mining Co., Anaconda, plans a plant for manufacture of phosphoric acid, to cost over $1 million.

NEW HAMPSHIRE

TILTON, N. H.—Johns-Manville Corp., 22 East 40th St., New York, will let contracts through H. J. Kuljian & Co., engineers, 1518 Walnut St., Philadelphia, for a manufacturing plant, including boiler house and waste treatment plant, to cost about $1 million.

NEW JERSEY

TRENTON, N. J.—Crescent Insulated Wire & Cable Co., 319 North Olden Ave., plans a manufacturing plant to cost over $100,000. Bugbee & Co. Inc., Norman Ave. and Oakland St., is consulting engineer.

NEW YORK

ROME, N. Y.—Rome Cable Corp., Rome, will let contract soon for a manufacturing building to cost about $1 million.

OHIO

AKRON, O.—Comet Mfg. Co. has been incorporated by Leonard L. Stouffer, 79 Lee Dr., and associates, to manufacture house trailers and allied products.

CLEVELAND—Carpenter Mfg. Corp., 9523 Detroit Ave., succeeds the Carpenter Tool & Mfg. Co. and will build a new plant for manufacture of shutoff valves, unions, disconnect hose couplings and similar products. Henry Fawcett is president.

LODI, O.—Lodi Foundry Co. has been incorporated with $25,000 capital Carlton Brewster and associates. Ralph A. Winter, Rowland Bldg., is statutory agent.

LORAIN, O.—Ohio Public Service Co., R. E. Burger, president, announces an expansion program at the Edgewater plant here, to cost about $5 million.

NEW PHILADELPHIA, O.—A. L. Schwab Industries Inc. has been formed to manufacture iron and steel products, by A. L. Schwab, president, and has taken over manufacturing space at 425 Belmont Ave. NW.

TOLEDO, O.—Schultz Die Casting Co., 1810 Clinton St., has let contract to Fred W. Entenman Co., 3323 Secor Rd., for an 80 x 240-foot plant building estimated to cost about $65,000.

TOLEDO, O.—Standard Oil Co., 526 High St., Cleveland, has let contract to Lummus Co., 420 Lexington Ave., N. Y., for design and construction of a lubricating oil plant in East Toledo, to cost about $8 million.

OREGON

HEPPNER, OREG.—Columbia Basin Electrical Co-Operative is in the market for materials for a 448-mile transmission to be built in 1947. A. A. Scouten is manager and Robert Welty, The Dalles, Oreg., is engineer.

PENNSYLVANIA

SOMERSET, PA.—Somerset Foundry & Machine Co. plans a one-story foundry and machine shop to cost over $50,000. E. C. Johnson, RFD No. 2, Somerset, is architect.

TEXAS

BAYTOWN, TEX.—Humble Oil & Refining Co., Baytown, has let contract to E. B. Badger & Sons Co., 75 Pitt St., Boston, for a dewaxing plant to cost about $2 million.

HOUSTON, TEX.—Sheffield Steel Co. of Texas, Industrial Rd., has plans in preparation for two open-hearth units costing about $2 million, and improvement and expansion of other units at cost of over $5 million.

PORT ARTHUR, TEX.—Gulf Oil Corp., Port Arthur, has let contract to Lummus Co., Esperson Bldg., Houston, Tex., for a polymerization plant costing $450,000 and two sulphurization units to cost $700,000.

WASHINGTON

SEATTLE—Austin Co. has been given contract by Trumbull Electric Mfg. Co., 303 West Hudson St., for a plant addition 30 x 240 feet, to cost about $40,000.